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TROPICAL DISEASES BULLETIN

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BUREAU OF HYGIENE AND TROPICAL DISEASES

TROPICAL DISEASES BULLETIN

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SUMMARY OF RECENT ABSTRACTS *

IV. TRYPANOSOMIASIS †

AFRICAN TRYPANOSOMIASIS

General : Epidemiology

An account has been issued of the fourth meeting of the International Scientific Committee for Trypanosomiasis Research (p. 606), which discussed human and animal disease, and work on tsetse flies.

The West African Institute for Trypanosomiasis Research (p. 607) has 4 sections—Entomology and Epidemiology at Kaduna, and Protozoology and Veterinary Work at Vom (which is free from tsetse flies). The report gives an outline of the work done in 1951.

A study of the epidemiology of sleeping sickness in the Gambia has been published by HUTCHINSON (p. 1123), who shows that where contact between man and fly is sustained, and the fly population lives on the same group of people, the incidence is high, reaching its maximum at the beginning of the rice-farming season. It falls abruptly in villages more than a mile from fly foci. Where contact is restricted to the latter part of the wet season when the fly disperses, the incidence is low. The high infection rates are found in the Upper River Division around side creeks, and the main river valley shows low rates. In the river flats 30–120 miles up river, the mangroves provide a permanent habitat for the fly, but villages are sited well back from the river.

YOUNG (p. 1158) found only a very low incidence of trypanosomes in a large number of blood slides examined in Liberia.

The Annual Report for 1951–52 of the Nigerian Sleeping Sickness Service (p. 486) shows that the incidence of new cases found was 0·245 per cent. There was an alarming spread of *G. morsitans* in Eastern Zaria, threatening the southern end of the Anchau corridor, and killing many cattle. Over 700 miles of streams were cleared during the year.

PINTO (p. 392) reports on the work of the Sleeping Sickness Commission in Portuguese Guinea, where the incidence of new cases was found to be

* The information from which this series of summaries has been compiled is given in the abstracts which have appeared in the *Tropical Diseases Bulletin*, 1953, v. 50. References to the abstracts are given under the names of the authors quoted and the pages on which the abstracts are printed.

† For previous articles on trypanosomiasis in this series see the May issues of the *Tropical Diseases Bulletin* each year since 1939.

0·9 per cent., almost half the cases having involvement of the central nervous system. Work was carried out on the cultivation of *T. gambiense* and on chemo-resistance, and also on tsetse flies (44 of 4,130 *G. palpalis* showed trypanosomes, but only 1 in the salivary glands). An account is given of control measures, including pentamidine prophylaxis.

The Report of the Tsetse Fly and Trypanosomiasis Committee of the Colonial Office (p. 388) contains accounts of work on the flies, on the epidemiology and treatment of human sleeping sickness, and on various aspects of animal trypanosomiasis.

The report of the East Africa High Commission (p. 389) on tsetse and trypanosomiasis research for 1951 contains an essay by the late Dr. H. M. O. Lester on the development of a practical policy for research and reclamation, and much information on the organization at present existing. It discusses the work sponsored on drug therapy and prophylaxis in animals, on tsetse research and reclamation, and it should be read in full. The report of the same organization for 1952 (p. 1018) contains much information on population studies, pupal sites, laboratory rearing, animals used for blood meals in nature and other work on tsetse flies. Studies of the pathogenicity of *T. brucei* and *T. rhodesiense* for animals have been continued, and research has been carried out on drugs used for the animal diseases. Reclamation schemes are in operation in Kenya, Tanganyika and Uganda, and progress on them is reported. The full original abstract contains much of the essential information included in the report itself, and may be read with advantage.

Transmission

Leeson (p. 608) has prepared 4 maps which show the distribution of 6 species of *Glossina* concerned with transmission of trypanosomiasis, and the recorded distribution of *T. gambiense* and *T. rhodesiense*. The Directorate of Colonial Surveys (p. 1022) has issued two coloured maps showing the distribution of various species of tsetse flies in West Africa and East Africa north of the equator. These are based on information collated by Potts, and a third map is to be published later.

Geigy and Huber (p. 199) investigated the problem of limitation of species of *Glossina* to particular types of vegetation, by studying their respiration, which must be closely linked to water-loss. They were unable to find great differences in the stigmata, such as might have been expected, and they conclude that there is little difference in temperature and humidity between fly haunts in various types of vegetation. In comment Buxton notes that the authors do not refer to work done in the extreme climate of Northern Nigeria, which points to the opposite conclusion.

A long monograph on the ecology of *G. palpalis* in Northern Nigeria has been published by Nash (p. 1124); this is based on research carried out from 1944 to 1951. He discusses the habitat, largely in fringing forest, and its importance to the fly in the changing climatic conditions. He has studied longevity, breeding habits, feeding and infection with trypanosomes. He also discusses control. The monograph should be read in full.

Gil Collado (p. 14) gives details of the distribution of *G. palpalis* in Spanish Guinea and Fernando Po. Roubaud (p. 14) describes a dark form of *Glossina palpalis* from the mangroves of the coast of the French Cameroons, which appears to be less frequently infected than *G. caliginea* with pathogenic trypanosomes, *e.g.*, *T. vivax*. A census of *G. palpalis* and *G. pallidipes*, and of animals, has been made by Glasgow and Wilson (p. 915) in a Kenya peninsula projecting into Lake Victoria.

Jackson (p. 487) shows that seasonal variation can be detected in the

mean size of tsetse flies, and that a negative correlation may be found between size and mean saturation deficiency at 2 p.m. 2 months before capture. He (p. 800) describes a mixed population of *G. morsitans* and *G. swynnertoni* in Tanganyika, and describes his methods of sampling the flies in their natural habitat. He also (p. 394) describes a new specific character for tsetse flies of the *morsitans* group.

A survey of *G. morsitans* in the Lago district of Mozambique is reported by Serrano (p. 395).

A considerable study of the breeding habits of *G. swynnertoni* has been carried out by Burtt (p. 287), confirming previous observations that few pupae are to be found in the wet season, though they are present on the surface of the bare soil protected by heavy overhead cover. In the dry season pupae are more frequently buried, probably because the larvae can penetrate the dry looser soil. There is a movement of breeding places, pupae occurring in thickets beside rivers during the hot dry season, but not in the early part of the dry season.

Burtt (p. 801) records the loss by a tsetse fly of its salivary gland infection with *T. brucei*, which at the same time became attenuated in virulence.

Henrard (p. 487) describes a new tsetse fly of the *fusca* group, which he names *G. vanhoofi*.

Aetiology

In a study of a strain of *T. gambiense* made resistant to tryparsamide, Tobie and von Brand (p. 916) found that the resistant strain was less virulent to animals than the original strain, though eventually fatal. They discuss this phenomenon.

Inoki and his colleagues (pp. 289, 394) have carried out experiments with a laboratory strain of *T. gambiense* which is so sensitive to inactivated human serum than an intraperitoneal injection of 0·4 ml. of the serum would cure an early infection (in mice) at once, but a subcutaneous injection of 0·2 ml. would permit relapse. Investigation of relapse strains obtained in this way showed that they differ from the original strain, and from each other, in immunological properties.

Williamson and Rollo (p. 92) have analysed the factors which promote the survival of *T. rhodesiense* in cultures free from serum, noting particularly the stimulating effect of amino-acids.

Burtt (p. 394) has recorded the mean temperatures of sheep and goats infected with *T. rhodesiense*, which are raised above the temperatures of uninfected animals.

Diagnosis and Clinical Findings

Strains of *T. gambiense* from Portuguese Guinea are readily cultivated in modifications of the Razgha-Reichenow or Weinman media, and Pinto (p. 799) shows that of 30 patients, blood culture was positive in 29, gland juice examination in 27 and blood smear examination in 8. Neujean and Evens (p. 15), however, found that for diagnosis of *T. gambiense* infection gland puncture and examination of blood films gave better results than blood culture in untreated cases, but that culture was more successful in relapsed cases. They note that the blood of a healthy person, which is one ingredient of the culture medium, varies considerably from person to person, and even in the same person from time to time, thus affecting the efficiency of the medium.

Muraz (p. 15) remarks that sternal puncture sometimes reveals *T. gambiense* when other methods of diagnosis have failed, but he points out the danger of pushing the trocar through into the heart, an accident which

has occurred. Pinto *et al.* (p. 800) cultivate bone-marrow, using a modification of the Weinman medium; with this method they found *T. gambiense* in 7 of 8 patients.

Schoenaers (p. 1023) has used the complement-fixation test in *T. gambiense* infection, the antigen being prepared from *T. equiperdum*. In controls the results were negative, but in trypanosomiasis 95·2 per cent. of the patients gave positive results. The test is therefore highly specific; it is most strongly positive in cases in which parasites can be found in blood, lymph or cerebrospinal fluid.

Discussing the diagnosis in West African patients suspected of trypanosomiasis, Baylet (p. 14) remarks that filariasis commonly causes a clinical picture closely resembling that of trypanosomiasis.

A clinical and pathological study is reported in considerable detail by Gallais and Badier (p. 488) of *T. gambiense* sleeping sickness in an African patient who died in France.

An electrophoretic study of blood protein in animals infected with *T. brucei* and man infected with *T. gambiense* shows reduction in albumin and increase in gamma globulin (Ganzin *et al.*, p. 93). Trincão *et al.* (pp. 685, 686) have investigated serum iron, copper and zinc, and plasma fibrinogen, in sleeping sickness. They (p. 93) have examined tissue cultures of bone-marrow in the early stages of sleeping sickness [presumably *T. gambiense* —the work was done in Portuguese Guinea], finding a delay in maturation of erythroblasts and granuloblasts, as others have done.

A study of the eyes in *T. gambiense* infection has been made by Pieraerts (p. 16), who concludes that the specific lesion of trypanosomiasis, if it exists at all, is of little importance, and that visual complications in the course of treatment are purely toxic. The dangerous arsenical treatment is indicated only in the 3rd stage of the disease.

Bell (p. 286) discusses the cerebrospinal fluid in *T. rhodesiense* sleeping sickness, and the prognostic value of the findings in an outbreak in Tanganyika Territory.

Treatment

Lourie (p. 17) discusses the evaluation of chemotherapeutic agents for trypanosome infections, and the biological standardization procedures needed for such work. Eagle and Doak (p. 686) have written a comprehensive review of the toxicity and parasiticidal activity of arsenobenzenes in relation to their structure.

Jonchère and his colleagues (pp. 200, 1024) have used melarsen oxide in 3 per cent. solution in propylene glycol injected intravenously, the patients being in hospital and fasting. The dose advocated was 3 mgm. per kgm. given daily for 3 days, the course being repeated at an interval of 3–4 weeks if considered desirable. It is a powerful drug with only a small margin of safety and should not be preferred to Mel B. The toxicity of these compounds prevents their general use in the field at present, but they will cure many otherwise incurable cases.

Arsobal (3854 RP) is the French equivalent of Mel B. It has been used by Ceccaldi (pp. 288, 609) in Brazzaville. Toxic effects were observed, but the drug is a powerful trypanocide which acts very quickly on trypanosomes in the blood and glands and in the cerebrospinal fluid, and it cured 40 per cent. of a group of patients with early meningo-encephalitis who had not responded to the usual drugs and who would otherwise have died. Results from repeated courses were no better than from a single course. The drug should at present be reserved for use in centres where the patients can be kept under observation. Pinto (p. 395) has used Arsobal in a single

[presumably intravenous] dose of 4 mgm. per kgm., given slowly, in the treatment of 15 early cases of sleeping sickness in Portuguese Guinea. The injection was well borne and the results were apparently favourable. Ceccaldi *et al.* (p. 93) tested Trepolysin (a trivalent arsenical) in *T. gambiense* infections in man, without success.

Claessens (p. 17) notes that a strain of *T. gambiense* in the Belgian Congo was found to be resistant to tartar emetic.

Little evidence of immunity was found by Launoy (p. 290) in rats which had been infected with *T. gambiense* (Yaoundé strain) and cured with lomidine, and then reinfected with the same strain. But in comment Lourie suggests that the apparent absence of acquired immunity may be attributable to the labile antigenic constitution of the trypanosome which may enable it to circumvent the host's immunity.

Drug Prophylaxis

Lotte (p. 1025) discusses chemoprophylaxis with pentamidine. Injections at intervals of 6 months will protect a population, but it has not been proved that injections at intervals of one year will do so. Protection is inversely proportional to the number of persons left untreated. There is a rate of infection below which the cycle trypanosome-man-fly is broken. In epidemics chemoprophylaxis gives rapid results; in the active endemic form it must be prolonged; in the residual endemic form it is open to discussion.

Lotte (p. 286) gives an account of the sleeping sickness focus of Nola (French Equatorial Africa) and its control by the French mobile service. Le Gac and Ziegler (p. 288) refer to this focus and to control achieved by prophylactic lomidine there. They also describe the success which has attended the use of this drug every 6 months for 18 months in another focus where effective measures against tsetse flies were not practicable. Each dose was 4 mgm. per kgm. of body weight and untoward reactions were rare among the 57,978 injections given. The indices of infection were reduced to about one-thirteenth of the original figure. The authors conclude that this is the method of choice for rapidly clearing serious foci of infection. Le Gac and Mulet (p. 689) used lomidine prophylactically in a focus of sleeping sickness in French Equatorial Africa where the rate of new cases had been 12·6 per cent., with the result that the rate fell to 0·11 per cent.

An account of sleeping sickness in the coastal area of Senegal is given by Moulanier and Diouf (p. 915), who show that the index of new cases has fallen from 1·46 per cent. in 1949 to 0·06 in 1951, largely as a result of pentamidine prophylaxis. In part of the Belgian Congo pentamidine has been used in prophylaxis in doses of 5 mgm. per kgm. A second injection was given 6 months after the first, and Burke (p. 688) reports only a few cases of intolerance to the drug. A few new cases of sleeping sickness were found a year or more after the first injections, and were in an advanced stage. De Scheitz and van Hoye (p. 688) gave pentamidine (about 4·5 mgm. per kgm.) to villagers in the Belgian Congo twice at intervals varying from 8 to 11 months, and failed to find cases of sleeping sickness in those who received the drug, though the disease was fairly common in these communities before administration. They plan to give a third injection.

In Mozambique prophylaxis is attempted by injections of antrypol or pentamidine, but the numbers recorded in the Annual Report of the Trypanosomiasis Commission (p. 392) are too small to permit estimation of the value of these drugs. The distribution of cases of human sleeping sickness remains as before, but in the incidence is not high. Most of the report deals with animal trypanosomiasis and with studies of *Glossina*.

In laboratory experiments Lourie (p. 687) has shown that suramin can inhibit some of the toxic effects of pentamidine without inhibiting its therapeutic action. Each of these drugs is therapeutically active at low concentration and the suramin-pentamidine salt would become dissociated during the long period of therapeutic activity, and each drug would then act independently. The suramin could be given first, followed a few hours later by the pentamidine, and this procedure would probably be useful in mass prophylaxis, though more laboratory work is needed before large-scale prophylaxis is attempted. Beaudiment and Zozal (p. 687) adopted the method discussed by Lourie and gave suramin and lomidine at various intervals within a few hours of each other, or actually at the same time. These trials were favourable and the authors appreciate certain advantages which this method could present in mass prophylaxis and treatment.

Control

Abbott (p. 17) discusses the control of sleeping sickness among the Azande of the Southern Sudan, which has become easier as a result of the Zande Development Scheme.

Rupp (p. 287) has attempted control of *G. palpalis* var. *martinii* by hanging black cloth impregnated with DDT over the streams, and claims considerable success.

The Annual Reports of the Tsetse Survey and Reclamation Department of Tanganyika for 1950 and 1951 (p. 914) show that discriminative clearing and settlement of the people are being continued as important measures of control. Details are given of distribution of the various species of *Glossina*, and of control by deflying stations on roads.

Trypanosomiasis of Animals

Work on the trypanosomiasis of animals includes an extensive monograph by Hornby (p. 17), a map and explanatory notes on the distribution of trypanosomes pathogenic to domestic animals in French West Africa (p. 489; Mornet, p. 1026), and papers by Chandler (p. 18) and Tendeiro (p. 1127) on susceptibility to various trypanosomes. Browning *et al.* (p. 1026) discuss acquired immunity, and quote experiments which do not indicate that active immunization would be useful in nature.

Research on Antrycide has been carried out by Roubaud (p. 94), Andrienne (p. 290), and Ormerod (p. 292), and on drugs of the phenanthridinium series by Walls and Beveridge (p. 94), Woolfe (p. 395), and Burdin and Plowright (p. 489). Arsenical drugs have been investigated by Cantrell (p. 917) and Launoy and Prieur (p. 1028), and the antibiotic achromycin by Hewitt *et al.* (p. 690).

Heisch and Garnham (p. 1028) found trypanosomes in bats on the East African coast, and development forms in certain *Aëdes* fed on them; it seems probable that mosquitoes may be vectors of this infection.

AMERICAN TRYPANOSOMIASIS

CHAGAS'S DISEASE

Accounts of Chagas's disease have been written by Dias (p. 610) for the United States, Mexico and Central Africa, de Lucena (p. 490) and Laranja *et al.* (p. 610) for Brazil, and Talice *et al.* (p. 490) for Uruguay.

Transmission

In an investigation on Triatomid bugs Gajardo Tobar (p. 491) found that larvae and nymphs can withstand starvation considerably longer than adults (for as much as a year) and that the bugs have great power to withstand adverse climatic factors.

Dias (pp. 691, 1127, 1128) gives a list of bugs which have been found infected with *T. cruzi* in South America, noting that *Rhodnius prolixus* is the chief vector of *T. cruzi* and *T. rangeli*; he also gives a list of reservoir hosts.

Triatoma infestans is incriminated as an important vector in many parts of Brazil:—in São Paulo (infection rate 25·19 per cent., Pinto, p. 492), where it feeds chiefly on man, dog, chicken and cat (Corrêa and Aguiar, p. 692) and where nymphs and adults have been found infected (Corrêa *et al.*, p. 692); in Minas Gerais (Salgado, p. 491; infection rate 18·54 per cent., Pinto *et al.*, p. 491; 24·6 per cent., Dias and Brant, p. 693); in Rio Grande do Sul (infective rate 56·69 per cent., Coutinho *et al.*, p. 694); and in the State of Rio de Janeiro (infection rate not high, de Bustamante and Gusmão, p. 1129). *T. infestans* is also incriminated in other countries of South America—with *T. dimidiata* (Dias, pp. 1127, 1128)—and in Argentina (Romaña *et al.*, p. 1129). Although *T. infestans* was the only infected bug found in São Paulo by Ramos (p. 801), infection in other bugs is reported elsewhere in Brazil:—Minas Gerais—*T. sordida* and *Panstrongylus megistus* (Pinto *et al.*, p. 491; Dias and Brant, p. 693), Ceará—*T. brasiliensis* (infection rate 7·63 per cent., Machado and Pinto, p. 492), Paraiba—*Panstrongylus megistus* and *T. maculata* (de Lucena and Costa, p. 1128).

Aetiology

Galliard (p. 19) has made a study of the life cycle of *T. cruzi* (a strain which shows a predilection for the peritoneal cavity), and concludes that in the vertebrate host the slender blood forms give rise to stumpy forms which invade the reticulo-endothelial cells, where they become leishmanial forms which are carried into the muscles; there they multiply and are eventually transformed into the definitive slender trypanosomes, sometimes after passing through a leptomonad or crithidial stage, or both.

Romaña and Toranzos (p. 1130) have succeeded in cultivating *T. cruzi* in eggs, obtaining abundant extracellular colonies.

Localization of *T. cruzi* in pancreatic cells was observed by Pizzi (p. 1130) in infected mice, with areas of fat necrosis. Pizzi and Prager (p. 95) show that inoculation of mice with an old laboratory culture of *T. cruzi*, quickly phagocytosed, led to the development of marked immunity.

Tests and Clinical Findings

Pellegrino and Brener (p. 493) discuss the Davis merthiolate technique for the complement-fixation test in Chagas's disease. They (p. 493) found that a polysaccharide fraction from culture forms of *T. cruzi* was not useful in this test, and they conclude (p. 493) that the complement-fixation test has little value in this disease because the results are often negative when other tests are positive. Unti and da Silva (p. 692), on the other hand, regard the complement-fixation test as the surest test for Chagas's disease, and have found it positive in 20 per cent. of a large number of samples of blood from various parts of São Paulo. Reactors should be regarded as carriers of the disease, and all blood donors should be examined by this test. Dias and Brant (p. 693) found that the complement-fixation test was positive in more than two-thirds of the population of part of Minas Gerais,

and in part of São Paulo Ramos (p. 801) records positive tests in 14·9 per cent. of a small number of blood samples.

In a study of 54 patients with cardiac lesions in Argentina Bettinotti (p. 292) found that the complement-fixation test for Chagas's disease was positive in 31 and negative in 23. He refers to the use of BHC or dieldrin for widespread use in houses, to control the bugs. In a study of chronic myocarditis in rural Venezuela Pifano and Benaím Pinto (p. 201) note that Chagas's disease was present in half their cases, often with helminthic or other infections. Pifano and Marcuzzi (p. 202) and Marcuzzi (p. 202) attempted to define the effects of the various factors by animal experiment, but found nothing specific in the lesions produced.

Romaña (p. 1131) refers to three conditions which may be of trypanosomal origin but which are often misinterpreted, *viz.*, orchi-epididymitis in young children, inflammation of the parotid gland and strabismus.

A case of apparently congenital Chagas's disease is reported by Romaña *et al.* (p. 1130).

Treatment

In therapeutic experiments Romaña (p. 1131) found that certain antibiotics were inactive against *T. cruzi*. The compound Bayer 7602 was toxic and Eagle's compound 70-A was inactive. An oxyarsenobenzol preparation had some activity in infected animals and man but though well borne intravenously it gave toxic symptoms if the dose was increased, and there was evidence that it did not completely eradicate the infection in the doses used. Various antimalarial drugs were ineffective.

An extensive trial of 30 antibiotics against *T. cruzi* both *in vitro* and *in vivo* was disappointing; the *in vivo* results were all essentially negative and no cures were obtained in experimental animals (Packchanian, p. 612). Prodigiosin and polymyxin B are able to inhibit the growth of *T. cruzi* in culture media at concentrations of 1 μgm. per ml. and 100 μgm. per ml. respectively (McRary *et al.*, p. 918). The antibiotic rimocidin proved lethal to *T. cruzi* within 24 hours at a dilution of 1 in 80,000 (Seneca *et al.*, p. 120).

Cole *et al.* (p. 916) found Furadroxyl ineffective against *T. cruzi*, and, though active against some other trypanosomes, unlikely to be useful in human disease because of its low therapeutic index in mice.

Nakamura and James (p. 611) have tested various purine and pyrimidine derivatives for action on *T. cruzi*; the most active was 2 : 6-diamino purine.

Goble (p. 20) has made a study of Chagas's disease in dogs, in connexion with the evaluation of compounds found to be active in mice against *T. cruzi*. Pentaquine gave promising results but in doses which produced some toxic effect.

High doses of cortisone aggravate *T. cruzi* infection in mice, but lower doses produce a slightly beneficial effect (Pizzi *et al.*, p. 95).

Control

Di Primio (p. 802) discusses the construction of houses which would be unfavourable to Reduviid bugs, giving details of concrete and other materials used.

Schiavi *et al.* (p. 1028) used mixtures of DDT and BHC against *T. infestans* in Brazil, with good initial but poor residual effect. Pinto and Bicalho (p. 494) have used BHC and DDT as residual sprays in a large number of houses in Minas Gerais, with satisfactory results, and Dias and Pinto (p. 495) and Pinto (p. 495) report favourably on BHC used for the same purpose. Dias *et al.* (p. 611) think that spraying with BHC need

not be repeated at intervals of less than 6 months. Haron (p. 918) has used wettable BHC successfully against *T. infestans* in Brazil, and advises that it should be used twice each year. Da Silva and Unti (p. 691) note that one application of BHC each year is insufficient to eradicate the bugs; two or three applications are needed.

OTHER TRYPANOSOMIASES

A trypanosome which is probably a new species (and is named *T. diasi*) has been found in a monkey in Brazil. Deane and Martins (p. 1029) show that it can undergo cyclical development in Reduviid bugs, and point out the possibility of confusion with *T. cruzi* and *T. rangeli* in them.

Pessôa and de Freitas (p. 396) note that *T. rangeli* in the blood and *Leishmania brasiliensis* in fixed tissues may be mistaken for *T. cruzi*, but point out that in both these sites *T. cruzi* can be recognized by the large size of its kinetoplast.

T. ariarii is related to (if not identical with) *T. rangeli*, and has been found in man in Colombia. Groot (p. 203) has studied its development in *Rhodnius prolixus*. He concludes that it undergoes cyclical development in the bug, in which it first develops in the gut, later invades the body cavity and reaches the salivary glands. The infection may be by bite, or by contamination with infective bug faeces. In comment Hoare remarks that, if these observations are confirmed, this is the first example of a trypanosome with a dual course of development ending in the anterior station and the posterior station. *Charles Wilcocks*

MALARIA

Pagès, François. Le paludisme. [**Malaria**] 114 pp., 3 figs. 1953. Paris: Presses Universitaires de France, 108, Boulevard St-Germain.

This booklet is one of the well known "*que sais-je?*" series issued by the *Presses Universitaires de France*, which give up-to-date information on almost every imaginable topic. It is a very well written, clear and accurate account of malaria that should be comprehensible even to readers without any previous knowledge of the subject, and it is reasonably up to date. It is not addressed to the malariologist but it provides a vivid description of the problems that the malariologist has to solve and of the means at his disposal for the fight against the disease. As a contribution to an encyclopaedia of general knowledge it would be hard to beat. *Norman White*

An. Inst. Med. Trop. Lisbon. 1952, June, v. 9, No. 2, 331–687. Número dedicado ao 1.° Congresso Nacional de Medicina Tropical. Malária. [**The First National Congress of Tropical Medicine: Malaria**] [24 papers.]

The First National Congress of Tropical Medicine to be held in Portugal marked the 50th anniversary of the foundation of the Institute of Tropical Medicine in Lisbon. This volume contains the text of the 24 papers contributed to the Malaria Section of the Congress and summaries of the discussions to which some of them gave rise. Ten of the contributions deal with malaria and malaria control in Portuguese possessions overseas; 2 with antimalaria activity in Brazil; and 2 with the Belgian Congo. Noteworthy among the general subjects were contributions on nation-wide

malaria eradication projects (DDT) by Paul Russell; the superiority of blood films made by scarification of the skin for the diagnosis of malaria (van den Berghe, Chardome and Peel); malaria suppression with Daraprim [pyrimethamine] and chloroquine (3 papers); blackwater fever (Foy). Cambournac contributed an interesting account of the epidemiology and control of malaria in Portugal. *Norman White*

Brunetti, Rosemary. **Outbreak of Malaria with Prolonged Incubation Period in California, a Nonendemic Area.** *Science.* 1954, Jan. 8, v. 119, 74–5.

The occurrence of 34 related cases of *P. vivax* malaria in August 1952 in a semi-isolated vacation camping area in California provided ideal conditions for the epidemiological study of malaria in a non-immune population in a non-endemic area.

The population concerned consisted of 1,800 persons associated with the Camp Fire Girls organization, so that records for follow-up purposes were readily available. The campers were drawn from many parts of central California and none had any previous exposure to malaria. State Health Department records showed that naturally contracted malaria had not been reported there since 1945.

It was clear that the source of infection was a Korean veteran with relapsing *P. vivax* malaria who had been camping in the same neighbourhood from July 4th to the 7th and who had then been exposed to innumerable anopheline mosquitoes [species not stated]. The camps opened late in June and closed early in August, so that the incubation period could be established with some precision. Probably infective mosquitoes were active in the area after July 10th: all those persons infected had been there after this date and no cases were reported in the group camping there before that.

Nine of the cases occurred in the autumn of 1952 and the remaining 25 in the spring of 1953: the incubation periods in the two groups were 12 to 38 days and 226 to 307 days, respectively. The first occurred on August 3rd 1952 and the last on July 6th 1953. Altogether 1,200 campers were present after July 10th 1952 and as very many of them returned in 1953, a close follow-up has been possible. The evidence to date suggests that there have been no missed cases.

The author notes that this single outbreak supports the hypothesis that two-thirds of the *P. vivax* infections contracted in autumn remain clinically latent for 8 to 9 months [this *Bulletin*, 1939, v. 36, 90].

H. J. O'D. Burke-Gaffney

Frizzi, G. Étude cytogénétique d'*Anopheles maculipennis* en Italie. Extension des recherches à d'autres espèces d'anophèles. [**A Cytogenetic Study of** *Anopheles maculipennis* **in Italy. Extension of Research to other Species of** *Anopheles*] *Bull. World Health Organization.* Geneva. 1953, v. 9, No. 3, 335–44, 8 figs.

The arrangement of the salivary gland chromosomes of "*Anopheles maculipennis labranchiae* var. *atroparvus*" [*A. m. atroparvus*] was used as a standard for a study of the arrangement of chromosomes in other species of the *maculipennis* group. The mosquitoes were captured in the Po valley region of Italy. The chromosome structure of *atroparvus*, of *labranchiae* and of the hybrids between them was constant. *A. m. typicus* differed from *atroparvus* in that the third chromosome had a paracentric

inversion of the right arm. *A. sacharovi* could be distinguished by a paracentric inversion of the left arm of the third chromosome and also a slight inversion of the X chromosome. *A. m. messeae* showed considerable paracentric inversion in the right arm of the third chromosome.

The salivary gland chromosomes of larvae hatched from 1,570 eggs were examined and a correlation was found between the egg characters and the inversion of the X chromosome, *e.g.*, *subalpinus* had the standard X chromosome whereas *messeae* had a chromosome arrangement showing inversion. The examination of the chromosomes has therefore confirmed the classification of the *maculipennis* group according to morphological characters, but it may also be used to distinguish between types in which the morphological characters are variable. This cytogenetic method could also be used to clarify the phylogenetic relationships between the various forms of *maculipennis* in palearctic and nearctic regions [see this *Bulletin*, 1953, v. 50, 1004]. *C. Mary Harrison*

Gaud, J., Laurent, J. & Dupuy, R. Association d'anophèles avec d'autres culicidés dans les mêmes gîtes larvaires au Maroc. [**Association of Anophelines with Other Mosquitoes in the Same Breeding Places in Morocco**] *Bull. Inst. Hyg. Maroc.* 1952, v. 12, Nos. 1/2, 77–81.

During the years 1948–1952, about 36,000 anopheline larvae (8 species) and 30,000 culicine larvae (16 species) have been identified at the laboratories of the Morocco Institute of Hygiene. Examination of this material has revealed 1,468 species associations between the 2 forms of mosquitoes. These have been analysed and tabulated to show the probability of certain anopheline larvae being found together with certain culicine larvae. The authors suggest that the practical value of this knowledge during a rapid malariological survey, is that the presence of the larvae of a particular species of culicine in a water collection may furnish evidence of the suitability of that breeding place for a species of *Anopheles* which may be temporarily absent. *H. S. Leeson*

Bull. Inst. Hyg. Maroc. 1952, v. 12, Nos. 1/2, 55–72, 1 chart & 7 figs. (6 on 6 pls.). Données sur la biocénose culicidienne de quelques gîtes du Gharb en 1952. [**Biological Data on Mosquitoes in Breeding Places in the Gharb, Morocco.**]

This paper presents in some detail the physical, chemical and biological data concerning the waters of the rice-fields in the Gharb in the Northwest corner of Morocco. The survey was made in 1952 in an attempt to understand the factors which encouraged the propogation of malaria in that area.

Larvae and pupae of mosquitoes recorded from the different breeding places were: *Anopheles maculipennis sicaulti, Culex theileri, C. pipiens, C. univittatus, C. hortensis, Theobaldia annulata, Aëdes caspius* and *Uranotaenia unguiculata*. The only anopheline was present in each place at some time of the year and new breeding places seemed to be more favoured than the old ones.

The growing rice provided shelter for the larvae and protected them from insecticides to some extent; certain insecticides could not be used because of the harmful effect on the rice crop. It is realized that much more investigation has to be done if the problems caused in the rice fields are to be overcome. *H. S. Leeson*

Davidson, G. & Draper, C. C. **Field Studies of some of the Basic Factors concerned in the Transmission of Malaria.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1953, Nov., v. 47, No. 6, 522–35, 2 figs. [19 refs.]

A mathematical treatment of the interdependence of factors influencing the transmission of malaria was presented by Macdonald in a series of papers in the original in this *Bulletin* [1950, v. 47, 907; 1952, v. 49, 569, 813; 1953, v. 50, 871] and elsewhere [*ibid.*, 1952, v. 49, 1006]. In the present work, an effort was made to determine the numerical value for some of these factors in conditions of " holo-endemic " malaria in 2 villages, Mngeza and Mpakane, near the coast of Tanganyika, in which *Plasmodium falciparum* is the predominant parasite although *P. malariae* is not uncommon and both *P. vivax* and *P. ovale* also occur. A table provides details of a parasitological survey of 744 people in 8 age groups up to the group " 15 years of age and over ". Infant parasite rates were 21 per cent. (2 weeks to 2 months), 75 per cent. (3 to 5 months), and 88 per cent. (6 to 11 months), these crude rates being little different from the corresponding rates for *P. falciparum*. From these data a malaria inoculation rate of 0·0084, or 0·0094 if some infants from outside the villages are disregarded, is calculated [this *Bulletin*, 1950, v. 47, 907]. This means that one infectious bite occurs once every $3\frac{1}{2}$ to 4 months.

The paper goes on to describe the work done in the villages on the 2 vectors, *Anopheles funestus* and *A. gambiae*, to obtain quantitative information which would make possible a second measure of the malaria inoculation rate based solely on entomological data. It was necessary to estimate for this purpose the density and biting frequency of both vectors, their food preference and the number of persons per hut in the villages. Precipitin tests on 300 specimens revealed that both species, at least if taken at rest in huts, were entirely anthropophilic. It is unlikely that sufficient animals existed in the district to affect this conclusion materially. A combination of laboratory observations and space-spray and window-trap catches in normal and experimental huts in each village reveal a great deal of interesting information. Dissections of 700 *A. gambiae* and 1,119 *A. funestus* showed sporozoite rates of 4·7 per cent. and 3·4 per cent., respectively, there being little variation in these rates during the 4 months September to December of the study. Observations on laboratory-reared *A. gambiae* and *A. funestus* indicated that the first batch of eggs is usually laid after 2 blood meals and about 5 days after the emergence of the females. Dissections, involving 359 *A. gambiae* and 987 *A. funestus*, of mosquitoes caught resting in houses and leaving by window-traps indicated that subsequent blood meals and ovipositions occur at 48-hour intervals, mean monthly temperatures indoors at the time being 25° to 26·6°C.

Estimates of density in huts are based on a series of 22 and 29 window-trap catches in Mngeza (4 huts) and Mpakane (2 huts) corrected against a number of comparisons between window-trap catches and total resting adults exposed by flit-spraying of the huts. Thus, mean dawn catches by trap were 1·9 to 4·4 *A. gambiae* and 32 and 17·2 *A. funestus* for Mngeza and Mpakane, respectively, but these were shown, by the comparative catches, to be only 11 per cent. (*A. gambiae*) and 16 per cent. (*A. funestus*) of the total adult numbers in the hut. Appropriate correction results in a 24-hour density per hut of 17 *A. gambiae* and 200 *A. funestus* at Mngeza and 40 *A. gambiae* and 107 *A. funestus* at Mpakane. Finally, an average of 4 persons lived in each hut. With these entomological data it is then possible to calculate the number of infectious bites by *A. gambiae* and by *A. funestus* per person per night for each village. For example, for *A.*

gambiae in Mngeza: 17 (hut density) × 0·5 (biting frequency of each mosquito in days) × 0·047 (proportion of this species with sporozoites) ÷ 4 (persons per hut) = 0·099, or 0·1, infectious bites per person per night. Expressing the number of infectious bites as whole numbers the results are:—

	A. gambiae	*A. funestus*
Mngeza	1 in 10 nights	1 in 1 night
Mpakane	1 in 4 nights	1 in 2 nights

There is, in general, about one sporozoite inoculation per person per night, which is appreciably greater than the inoculation rate of once every 3½ to 4 months derived from the parasitological findings. In discussion, it is concluded that infants have an immunity which suppresses, before parasitaemia is patent, most of the infections transmitted to them. Only about once in 100 days does successful infection with subsequent parasitaemia happen. The duration and density of the patent infections are similar to those of non-immunes; but pathogenicity appears to be less. The nature of this infant immunity is uncertain.

A novel method is described for estimating the natural mortality rate of the vectors [see this *Bulletin*, 1954, v. 51, 4]. This depends on deriving a sporozoite rate from freshly caught mosquitoes (the immediate sporozoite rate) and from mosquitoes kept captive for the period of the extrinsic cycle (the delayed sporozoite rate) at the prevailing temperature. From an experimental feed on a child and graphical reference [*Fig. 1*, this *Bulletin*, 1952, v. 49, 574] the extrinsic period was, in this work, 13 days at 25·8°C. Delayed sporozoite rates were about 10 per cent. (*A. funestus*) and 11 per cent. (*A. gambiae*). The daily survival value of the mosquitoes is obtained by dividing the log of the ratio $\frac{\text{immediate sporozoite rate}}{\text{delayed sporozoite rate}}$ by 12 (the extrinsic period less 1) giving 0·93 and 0·92 for *A. gambiae* and *A. funestus* respectively. Conversely, the respective daily mortality rates would be 7 per cent. and 8 per cent. A practical point in conserving good numbers of mosquitoes for dissection at the end of the extrinsic period was to deprive them of water or wet filter paper for oviposition which was accompanied by a heavy mortality. A sugar-soaked lint suspended in a cage sufficed to feed them; they retained their eggs and the survival rate improved.

The data collected provide the means of estimating by the application of a formula [$s = \frac{p^n ax}{ax - \log_e p}$, this *Bulletin*, 1952, v. 49, 569] the proportion of bites on man which were infective to a mosquito in the villages under investigation. For *A. gambiae*: s = 0·047 (sporozoite rate), p = 0·93 (survival rate), a = 0·5 (biting frequency per day), n = 13 (duration of the extrinsic cycle). With these values x (the proportion of bites on man which infect a mosquito) is 0·02. That is, about 2 per cent. of all the mosquitoes feeding each night become infected. A separate estimate based on certain approximations is of a similar order. This aspect of the work suggests that selective biting of adults more than infants was probably not of material significance in the villages under study.

The paper concludes by considering the implications of the findings as regards the control of malaria by residual insecticides. The villagers are exposed to malaria transmission by very anthropophilic vectors which have a high survival rate and a rapid development of sporozoite. It is a highly stable type of malaria at a high level of endemicity involving overlapping infections in both mosquitoes and man. The conditions are such that the basic reproduction rate [this *Bulletin*, 1952, v. 49, 1006] is between 2,000 and 5,000. That is, a single infected non-immune person would be

responsible for this number of further transmissions. It is a transmission potential requiring substantial changes in the efficiency of transmission if control is to be effected. The authors estimate that the daily mortality rates of the vectors would have to be increased from 7 per cent. to at least 45 per cent., preferably to 60 per cent. and suggest, on the basis of earlier work elsewhere [this *Bulletin*, 1953, v. 50, 190, 1011], that residual sprays of 0·22 gm. per sq. m. of *gamma* BHC every 3 months, or of dieldrin at about 0·28 gm. per sq. m. possibly only once a year, would be adequate. Results with DDT in this earlier work were very conflicting and the desirability of testing the action of wettable powders of DDT in conjunction with control spraying is emphasized. No dosage or frequency for DDT spraying is put forward. *D. S. Bertram*

Doucet, J. Les anophélinés de la région malgache. [**Anophelines of the Madagascar Region**] 195 pp., 87 figs. [26 refs.] 1951. Tananarive-Tsimbazaza: Institut de Recherche Scientifique.

There is no claim to originality for this book; the matter it contains has nearly all appeared elsewhere; the contents have been specially selected because of their application to conditions in the island of Madagascar, thus forming a complete little handbook for malaria control workers in the island. There are about 100 pages in part I concerned with systematics, and nearly 100 pages in part II on malaria control measures.

The book follows the usual pattern with an introduction to the morphology of the mosquito in all its stages and a brief section on study methods. These are followed by a section on ecology and another on geographical distribution of the species of *Anopheles* illustrated by a map of the island. The main section contains a description of classification, keys for identification of females, larvae, pupae and eggs and lastly descriptions of the species. Important features of specific morphology are indicated by illustrations borrowed from authoritative sources. The species named as occurring in Madagascar are: *Anopheles coustani, obscurus, fuscicolor, mascarensis, radama, notleyi, brunnipes, funestus, funestus* var. *imerinensis, hancocki, theileri, marshalli, gambiae, gambiae* var. *melas, christyi, rufipes, pretoriensis, maculipalpis, pharoensis, squamosus*, and *squamosus* var. *cydippis*. Locality records are given for all of these except var. *melas*, about which there seems to be some doubt.

The second half of the book deals with malaria control measures in some number rather than in detail. Measures against the adult mosquitoes and then the larvae are grouped under the headings, natural, chemical and mechanical and whenever points can be elucidated by illustrations simple line drawings are provided, many of which are taken from other works with acknowledgements.

The book ends with Army regulations for malaria control in Indo-China dated 1935, in Madagascar dated 1949, a copy of a local pamphlet and a note concerning the incidence of malaria in the Army from 1947 to 1949. *H. S. Leeson*

Bhatia, M. L., Krishnan, K. S., Mammen, M. L. & Ramakrishnan, S. P. **Additional Records on "Pseudosporozoites" in the Salivary Glands of Mosquitoes.** *Bull. Nat. Soc. India for Malaria & other Mosquito-Borne Dis.* 1953, Nov., v. 1, No. 6, 178–81.

MacFarlane, R. G. & Husain, O. A. N. **Malaria in Servicemen.** [Correspondence.] *Lancet.* 1953, Sept. 26, 677–8.

One hundred and two cases of benign tertian malaria occurred in 1952–53 at the military hospital at Tidworth; 69 had a first attack (suppressed

primary cases); 33 had had one or more previous attacks. The patients had returned from Korea, Malaya or Hong Kong. The suppressive proguanil—100 mgm. a day—taken while abroad had been discontinued during the voyage home.

Examination of fit men revealed no subclinical parasitaemia. Suppressed primary malaria due to the temperate strain from Korea came on after an average latent period of 6 months compared with an average of 2½ months from the tropical (Malayan) strain. *G. R. McRobert*

Jaswant Singh & Ray, A. P. **Unusual Symptoms in** *Plasmodium vivax* **Infection.** *Indian Med. Gaz.* 1953, Oct., v. 88, No. 10, 520–22. [11 refs.]

The authors, from the Malaria Institute of India, refer to some previous records of urticaria and asthma in cases of *P. vivax* malaria, which disappeared after antimalarial treatment [this *Bulletin*, 1950, v. 47, 316, 954].

They then record the case of a man of 48 who had two attacks of what was evidently *P. vivax* malaria in 1949 and in 1950. In 1951 he developed a high temperature accompanied by a diffuse giant urticaria all over the body. This disappeared without treatment in a few hours but recurred two days later; a heavy *P. vivax* infection was then found in the blood and the eosinophiles were 13 per cent. No parasites were found in the stools.

The patient was treated with chloroquine followed by prophylactic proguanil. He remained afebrile for 3 months, after which an acute attack of asthma developed. This resisted antispasmodic treatment, but resolved spontaneously next day. The eosinophiles were now 18 per cent. In view of his previous history, chloroquine was given again although no parasites were found in the blood. The patient remained well during the next 21 months.

The authors discuss the various theories regarding manifestations of this kind in malaria [this *Bulletin*, 1937, v. 34, 225; 1950, v. 47, 316; 1951, v. 48, 861] and suggest that their patient had been sensitized by previous attacks of malaria and that the urticaria was due to an allergic state; and similarly that the subsequent asthma was brought about by a sub-patent parasitic relapse. It is of interest that the patient had a history of vasomotor rhinorrhoea and the question is posed whether these unusual manifestations in malaria are restricted to those with an allergic diathesis. If this is correct, persons entering a malarious district should be particularly careful to take suppressive treatment if they have an allergic history. Nevertheless such cases of allergic manifestations in malaria should be rare in hyperendemic areas, where host-parasite balance is well established.

H. J. O'D. Burke-Gaffney

Scheel, M. **The Treatment of Malaria with Resochin.** *Indian Med. Gaz.* 1953, Oct., v. 88, No. 10, 533–4.

The author reports on the treatment of more than 2,500 cases of *P. vivax*, *P. malariae* and *P. falciparum* malaria in indigenes in a district of Orissa. A single oral dose (adults) of 1 gm. Resochin, equivalent to 600 mgm. of the chloroquine base, gave relief within 24 hours. Tablets given at the onset of fever had no effect on the prevailing fever but prevented the next paroxysm. Smaller doses were not always successful. The dose recommended for children is: children of 1–2 years, 1 tablet (150 mgm. base); 2–5 years, 2 tablets (300 mgm. base); 6–12 years, 3 tablets (450 mgm. base). *B. G. Maegraith*

HANKEY, D. D., JONES, R., Jr., COATNEY, G. R., ALVING, A. S., COKER, W. G., GARRISON, P. L. & DONOVAN, W. N. **Korean *vivax* Malaria. I. Natural History and Response to Chloroquine.** *Amer. J. Trop. Med. & Hyg.* 1953, Nov., v. 2, No. 6, 958–69, 8 figs.

ALVING, A. S., HANKEY, D. D., COATNEY, G. R., JONES, R., Jr., COKER, W. G., GARRISON, P. L. & DONOVAN, W. N. **Korean *vivax* Malaria. II. Curative Treatment with Pamaquine and Primaquine.** *Ibid.*, 970–76. [13 refs.]

JONES, R., Jr., JACKSON, L. S., di LORENZO, A., MARX, R. L., LEVY, B. L., KENNY, E. C., GILBERT, M., JOHNSTON, Marian N. & ALVING, A. S. **Korean *vivax* Malaria. III. Curative Effect and Toxicity of Primaquine in Doses from 10 to 30 mg. Daily.** *Ibid.*, 977–82.

di LORENZO, A., MARX, R. L., ALVING, A. S. & JONES, R., Jr. **Korean *vivax* Malaria. IV. Curative Effect of 15 Milligrams of Primaquine Daily for 7 Days.** *Ibid.*, 983–4.

COATNEY, G. R., ALVING, A. S., JONES, R., Jr., HANKEY, D. D., ROBINSON, D. H., GARRISON, P. L., COKER, W. G., DONOVAN, W. N., di LORENZO, A., MARX, R. L. & SIMMONS, I. H. **Korean *vivax* Malaria. V. Cure of the Infection by Primaquine administered during Long-Term Latency.** *Ibid.*, 985–8, 1 fig.

The incidence of *P. vivax* malaria among military personnel returning to the United States from Korea has proved a serious problem. While in the combat zone the troops were under chloroquine suppression. This proved highly effective, but since the drug does not destroy the tissue stages of the parasite, overt malarial attacks began to occur shortly after the men were repatriated. The number of new malaria cases admitted to military hospitals in the United States reached a peak of 629 per week in August 1951.

In the summer of that year large-scale studies were initiated in order to compare the efficiency of primaquine, a newly synthesized 8-aminoquinoline [this *Bulletin*, 1953, v. 50, 378], with that of pamaquin in reducing the relapse rate of Korean *P. vivax* malaria and to determine the optimum dose for primaquine. In the course of these studies 3,169 cases of *P. vivax* malaria were treated in military hospitals. The results are recorded in the 5 papers reviewed below:

I. Two groups of patients were treated at the time of an acute attack with a standard course of 1·5 gm. chloroquine base over a period of 3 days (first day 3 doses of 0·3 gm., second and third days 0·3 gm. once daily). The first group, consisting of 512 patients, received no other treatment. The second, consisting of 1,213 patients, was treated with primaquine or other 8-aminoquinolines in addition to chloroquine.

Of the 512 patients treated with chloroquine alone 355 were followed up for more than 4 months after treatment. Observations on this group formed the basis for a study of the natural history of Korean *P. vivax* malaria.

Of these patients 258 developed malaria in the United States between July 15 and December 31, 1951. These patients experienced a total of 715 attacks of malaria, an average of 2·8 attacks per patient. From an analysis of the data collected it was shown that Korean *P. vivax* malaria exhibits a bimodal pattern of clinical activity. The duration of the prepatent period could not be determined because the primary attack was suppressed by chloroquine in most cases. Six out of 36 patients who had an early primary attack during the summer of 1950 attested to a second attack 5 to 8 weeks later. After this period of early activity there follows one of long-term latency lasting from 6 to 14 months with a mean of 9·8 months. There is

then a second active period in which relapses may occur at frequent intervals. The disease terminates spontaneously within 2 years after sporozoite infection.

The pattern of clinical activity and long-term latency exhibited by Korean strains of *P. vivax* closely resembles that of the St. Elizabeth strain encountered in the southern United States. The proportion of Negroes among the patients treated was 5 per cent. only, a figure considerably lower than would be expected, suggesting that the American Negro has some degree of immunity against Korean *P. vivax* strains.

[The phenomenon of long-term latency exhibited by the Korean strain is described in this paper as characteristic of *P. vivax* infections met with in temperate climates, in contrast with strains encountered in tropical areas which relapse at frequent intervals after the primary attack without a period of long-term latency. As far as the abstracter is aware, however, the absence of long-term latency has been definitely established only for the Chesson strain of *P. vivax* encountered in New Guinea. Long-term latency is a constant characteristic of the Madagascar strain of *P. vivax* used in England for the treatment of neurosyphilis, which is presumably of tropical origin. Strains with this characteristic also occur in India and in Ceylon. The implication that long-term latency is confined to infections of non-tropical origin is therefore misleading.]

II. In this study 3 regimens of treatment were followed.

Regimen A; 355 patients with acute attacks of Korean *P. vivax* malaria received standard chloroquine treatment (first day 3 doses of 0·3 gm., second and third day 0·3 gm. once daily); 137 (39 per cent.) relapsed after this treatment.

Regimen B; 272 patients were treated with chloroquine as in Regimen A, and received in addition 27 mgm. pamaquin base (60 mgm. of the naphthoate salt) in 3 equally divided doses daily for 14 days; 2 patients (0·7 per cent.) relapsed.

Regimen C; 348 patients were treated with chloroquine as above and received in addition 15 mgm. primaquine base (26·4 mgm. of the diphosphate salt) in a single daily dose for 14 days; none of this group relapsed.

Clinically significant toxicity was not observed with either primaquine or pamaquin, although in the dosage employed pamaquin is potentially toxic in a small percentage of Negroes.

It is concluded that 15 mgm. primaquine base daily for 14 days, combined with standard chloroquine therapy (1·5 gm. base in 3 days) is the treatment of choice for the radical cure of *P. vivax* of Korean origin during late clinical activity.

III. Treatment was given to 963 patients with Korean *P. vivax* malaria at the time of a late acute attack, and they were followed up for more than 4 months thereafter. Patients received in rotation: (1) chloroquine 1·5 gm. base in 3 days as above; (2) chloroquine treatment as above plus primaquine 10, 15, 20 or 30 mgm. base daily for 7 or 14 days, commencing on the first day of treatment. When the daily dose of primaquine was 10 or 15 mgm. it was given in a single tablet; when the daily dose was 20 or 30 mgm., 10 mgm. were administered twice or thrice daily.

The relapse rate in patients treated with chloroquine alone was 43·8 per cent. It was reduced to less than 3 per cent. by all the regimens of primaquine used. The results indicate that a daily dose of 10 mgm. of primaquine for 14 consecutive days is adequate for radical cure of Korean *P. vivax* malaria. A daily dose of 20 mgm. for 7 days was effective in reducing the relapse rate.

No significant toxicity was observed with doses of 10 and 15 mgm. daily.

A daily dose of 20 mgm. of primaquine produced severe intravascular haemolysis in 1 of 14 Negroes. This dose was well tolerated by all other patients. Mild abdominal pain and cyanosis due to methaemoglobinaemia occurred in approximately one-fourth of the white patients treated with 30 mgm. primaquine daily, but these effects were not severe enough to interfere with normal activity.

IV. A group of 46 patients with acute late attacks of Korean *vivax* malaria were given standard chloroquine treatment, 1·5 gm. base in 3 days, as above; 31 patients received in addition 15 mgm. base primaquine daily for 7 days. In the former group 23 (50 per cent.) relapsed; in the latter 1 (3 per cent.) relapsed.

The authors note that the number of patients studied was relatively small and that in approximately one-third of the cases the follow-up period was only 90 to 119 days. They conclude, however, that the curative activity of primaquine in a daily dose of 15 mgm. for 7 days only is sufficient to warrant its use as a substitute for the standard régime of 14 days when conditions are such as to make it impractical to administer the drug over the longer period. They re-emphasize, however, that radical cure of Korean *P. vivax* malaria is easily achieved with curative drugs, and their recommendations refer only to infections incurred in that area.

V. This study was designed to evaluate the effectiveness of primaquine against Korean *P. vivax* malaria when given during long-term latency. Negroes were excluded because of their high racial immunity to *P. vivax* infections.

Treatment with primaquine (15 mgm. base in a single dose daily for 14 days) was given to 294 men who had been exposed to malaria in Korea during the summer of 1951 and had returned to the United States before January 1952. A control group of 331 men similarly exposed were given a placebo. None of those given the primaquine course developed malaria during the next 6 months. In the control group 58 men (17·5 per cent.) developed malarial attacks during the same period. *G. Covell*

Cooper, W. C., Myatt, A. V., Hernandez, T., Jeffery, G. M. & Coatney, G. R. **Studies in Human Malaria. XXXI. Comparison of Primaquine, Isopentaquine, SN-3883, and Pamaquine as Curative Agents against Chesson Strain *vivax* Malaria.** *Amer. J. Trop. Med. & Hyg.* 1953, Nov., v. 2, No. 6, 949–57, 2 figs.

In these studies, conducted at the United States Penitentiary, Atlanta, Georgia, 4 members of the 8-aminoquinoline group of drugs were tested against a New Guinea (Chesson) strain of *P. vivax*. The subjects of the test were white male volunteers with no previous history of malaria. Two experiments were carried out. In both cases infection was by the bites of 10 heavily infected mosquitoes. Treatment began on the third day of patent parasitaemia, provided that the temperature had reached 101°F. or more. Otherwise it was deferred until (but not beyond) the fourth or fifth day.

In the first experiment, 204 volunteers were divided into 6 groups, 34 in each. All drugs were given in 4 equal doses per day, the treatment lasting for 14 days. The subjoined table shows the dosage prescribed and the relapse incidence in each group following treatment. All doses are in terms of base.

	Daily dose of drug	Relapse rate per cent.
1. Primaquine,	20 mgm. plus quinine 1·0 gm.	15
2. Primaquine,	10 mgm. ,,	65
3. Isopentaquine,	60 mgm. ,,	35
4. SN-3883,	60 mgm. ,,	9
5. SN-3883,	30 mgm. ,,	21
6. Pamaquin,	60 mgm. ,,	82

Primaquine and SN-3883 appeared definitely superior to pamaquin and isopentaquine in their ability to cure Chesson strain *P. vivax* malaria when given in combination with quinine sulphate. The higher incidence of toxic side-effects with SN-3883 as contrasted with the almost complete absence of such symptoms with primaquine, makes the latter drug preferable for routine curative therapy.

The second experiment was undertaken to find out whether radical cure of Chesson strain *P. vivax* malaria could be effected if the period of treatment were cut from 14 to 7 days and the drug administered in a single dose. [It had been found (above) that primaquine in single daily doses of 15 mgm. for 14 days in combination with a standard course of chloroquine (1·5 gm. base in 3 days) could cure *P. vivax* infections contracted in Korea.]

Thirty volunteers were divided into 3 groups of 10. The dosage prescribed and the relapse incidence following treatment are shown below:

	Dosage	Relapse rate per cent.
1. Primaquine,	30 mgm. base daily for 7 days	90
2. Primaquine,	20 mgm. base daily for 7 days	80
3. SN-3883,	60 mgm. base daily for 7 days	100

In addition, each patient received 1·5 gm. base chloroquine during the first 3 days of treatment (first day 3 doses of 0·3 gm., second and third day 0·3 gm. once daily).

The high percentage of relapses in all groups indicates that experimental Chesson strain infections of the intensity induced by the bites of 10 heavily infected mosquitoes are not cured by regimens which have proved curative against Korean *P. vivax* malaria.

The authors note that it is not possible from these results to determine whether this reflects differences in strain or in intensity of exposure.

G. Covell

Thaeler, A. D., Jr., Arnold, J. & Alving, A. S. **A Clinical Study of Primaquine (S.N. 13,272) in the Treatment of Malaria among the Miskito Indians of Nicaragua.** *Amer. J. Trop. Med. & Hyg.* 1953, Nov., v. 2, No. 6, 989–99, 1 fig.

The observations here recorded were carried out along the margin of the lower Rio Coco river which separates Honduras from Nicaragua. The population are mostly Indians of the Miskito race, 50 per cent. of whom have Negro ancestors, and a few Caucasian ancestors. The object of the study was (i) to test the tolerance of the local population to primaquine, and (ii) to measure the response of field infections to treatment with the drug.

Adults and children with parasitaemia (320 with *P. vivax*, 1 with *P. falciparum*) living in 5 selected villages were treated with a combination of primaquine and chloroquine as follows:

Group 1: 121 patients; average adult dose, 10 mgm. primaquine base daily for 14 days, plus 450 mgm. chloroquine base daily for first 2 days.

Group 2: 151 patients; average adult dose 15 mgm. primaquine base daily for 14 days, plus chloroquine as above.

Group 3: 149 patients; average adult dose 20 mgm. primaquine base daily for 14 days, plus chloroquine as above.

Group 4: 87 control patients; chloroquine course only.

Over an observation period of 1 year none of the 321 patients treated with primaquine and chloroquine relapsed. There were 6 relapses (7 per cent.) among the 87 who received chloroquine alone. No evidence of toxicity was observed in any of those treated.

The authors conclude that primaquine is therapeutically effective for chronic cases of naturally acquired *P. vivax* infections in Eastern Nicaragua at doses as low as 10 mgm. base daily for 14 days for an average adult; and that it is safe and well tolerated by persons of all ages when given in doses of twice this amount. They observe, however, that the malaria found in that country does not present a severe therapeutic challenge. *G. Covell*

Treviño V., A., Amanda Reyes, Lydia & Mendoza M., F. Estudio sobre la actividad antimalárica en el hombre de un derivado sintético del alcaloide de la *hydrangea* 1698L. [**Study of Antimalarial Action in Man of a Synthetic Derivative of the Alkaloid of** *Hydrangea*] *Rev. Inst. Salubridad y Enfermedades Trop.* Mexico. 1953, Sept., v. 13, No. 3, 253–9, 1 fig. [10 refs.]

The English summary appended to the paper is as follows:—

"We have treated 27 patients with 1698L against acute malaria, divided in 2 groups. Group 'A' with 16 subjects was treated with 2 milligrams daily for 5 days; in group 'B' with 11 subjects treated with 0·099 milligrams per kilo of body weight, daily, for 14 consecutive days.

"In group 'A' we have obtained 4 apparent cures; in group 'B' we have not obtained any cures; we thought the 4 cases of group 'A' to have been spontaneous cures.

"The 1698L synthetic derivative of alkaloid from *Hydrangea* is not effective against Mexican strains of *P. vivax* and *P. falciparum*. It has a marked emetic action."

Phillips, Mary G. **Malaria Prophylaxis.** [Correspondence.] *Brit. Med. J.* 1954, Jan. 16, 155.

Two households residing at Ed Dueim in the Blue Nile Province of the Sudan, 100 miles south of Khartoum, were under drug prophylaxis with pyrimethamine throughout the malaria transmission season of 1953, which was unusually severe owing to exceptionally heavy rains. The first household, that of Dr. Phillips herself, who personally supervised the administration of the drug, consisted of 3 English adults, 3 English children under 4 years of age and 4 Sudanese servants. The second comprised 2 English adults and 3 children under 5 years of age. The dosage followed was 25 mgm. pyrimethamine for adults and 12·5 mgm. for children administered once weekly in a single dose. Of the 15 persons in the 2 households, all save 1 experienced attacks of malaria over a period of about 4 months. In 13 of the 14 cases parasites of *Plasmodium falciparum* were seen in blood smears. The blood of the remaining patient was not examined. All the attacks were mild in character. The only person who did not suffer from malaria during this period was an English child, 4 years old, who had had an attack 4 months earlier, before being placed on pyrimethamine prophylaxis. Proguanil had been used prophylactically in this area by a few English and Greek families during the post-war period, but the number of Sudanese families taking this drug is estimated as less than 1 per cent.

Dr. Phillips concludes that though it seems to mitigate the clinical symptoms, pyrimethamine in the dosage given fails to prevent attacks of *P. falciparum* malaria in this locality. *G. Covell*

Brou, M. Essais de prophylaxie antipaludique en milieu indigène au moyen du " Daraprim ". [**Trials of Pyrimethamine Prophylaxis in an African Community**] *Ann. Soc. Belge de Méd. Trop.* 1953, Oct. 31, v. 33, No. 5, 365–70.

The investigations here recorded were carried out in the vicinity of Masi-Manimba in the Belgian Congo, about 250 miles east of Léopoldville. Their object was to determine the minimum dosage of pyrimethamine required for effective prophylaxis against malaria attacks in a rural population [see also Vincke, this *Bulletin*, 1952, v. 49, 751].

African children from 7 to 16 years of age, 150 in all, were divided into 2 groups. The first received 12·5 mgm. pyrimethamine every 14 days, which represented approximately 0·5 mgm. per kgm. body weight in each dose. The other group received vitamin B2 tablets only, and served as a control. The great majority of malarial infections in this area are with *P. falciparum*; *P. vivax* is unknown, but a small proportion of infections are with *P. malariae*.

At the commencement of the trial the spleen index in the control group was 5 per cent. and the trophozoite index 54 per cent. In the pyrimethamine group the spleen index was 11 per cent. and the trophozoite index 41 per cent. Three months later the respective rates had fallen to 2·4 and 4·8 per cent. in the pyrimethamine group, the corresponding figures in the control group being 13·4 and 21 per cent.; 8 days after the last dose was given (7 months after the commencement of the trial) the trophozoite index was 6·5 per cent. in the treated group and 29·2 per cent. in the controls.

The authors consider it unwise to increase the dose of the drug, believing that the continuance of some degree of infection will prevent loss of premunition among the population. [Such conditions would, however, also favour the production of drug resistance.] *G. Covell*

Ketterer, W. A. **Economic Benefits of Malaria Control in the Republic of Indonesia.** *Pub. Health Rep.* Wash. 1953, Nov., v. 68, No. 11, 1056–8.

The Indonesian Ministry of Health, with assistance from the Technical Co-operation Administration Mission to Indonesia, has had in operation a malaria control programme from which some economic benefits are accruing; the assessment of these benefits is becoming a possibility from certain available data. In addition to being one of the world's worst malarious areas, Indonesia is afflicted with practically all the diseases known to man, among which tuberculosis, yaws, leprosy, trachoma and typhoid fever are pre-eminent.

The number of attacks of malaria each year suffered by individuals undoubtedly outnumbers the population (77 million). Epidemics have been known to kill one-fifth of the population of some districts in a single year.

DDT house-spraying has been in operation since 1950 and at the end of 1953 it was expected that 5 million people would be protected. Because these activities are mainly in agricultural areas the production of rubber, copra, tobacco, tea, palm oil, and, above all, rice, has been increased. Pre-war malaria control drainage schemes on the coast of north-west Java were neglected by the Japanese and were not opened up by local farmers when independence had been gained; *Anopheles sundaicus* returned and with it

epidemic malaria, so that soon valuable rice-producing areas reverted to wilderness. Such areas have since been reclaimed by means of DDT spraying; it is estimated that the initial cost of spraying was 2 per cent. of the annual value of the rice crop subsequently obtained.

On the east coast of Sumatra 15,000 people on palm oil estates were protected; infant parasite rates fell from 22 per cent. to nil. The decrease in hospital expenses of dealing with malaria was enough to finance the control scheme. Absenteeism fell by two-thirds, so that there was an overall increase in working days and production per man.

New areas of other islands formerly intensely malarious and uninhabited are being repopulated.

These are mere examples to illustrate the overall beneficial effects on many phases of the Indonesian economy, on the health of the people and their productive capacity. *R. Ford Tredre*

Montalván C., J. A. Campaña antipalúdica en el Ecuador. Métodos empleados y resultados obtenidos. [**Antimalaria Campaign in Ecuador: Methods Used and Results Obtained**] *Rev. Ecuatoriana de Hig. y Med. Trop.* Guayaquil. 1952, Jan.–Dec., v. 8/9, Nos. 1/4, 34–90, 1 folding map, 1 plan & 1 chart.

This lengthy paper describes the present malaria situation in Ecuador with special reference to antimalaria activity during the last 4 years. Malaria surveys have been carried out by the Malaria Section of the Endemic Diseases Department of the National Institute of Hygiene which was brought into being with the support of the Rockefeller Foundation to study the important health problems of Ecuador. In the extreme north of the country the Government have had the cooperation of the Interamerican Cooperative Public Health Service.

Malaria is prevalent throughout the coastal provinces of Ecuador and in many of the valleys of the interior. In low-lying coastal areas *Anopheles albimanus* is the chief vector: its breeding is intense from mid-February to the end of April. *A. pseudopunctipennis* and *A. punctimacula* are likewise prevalent in certain coastal areas but play only a subsidiary part in malaria transmission. In the valleys of the Andes Provinces *A. pseudopunctipennis* is the chief vector and may transmit infection throughout the year.

In March 1949 legislative sanction was given to the inauguration of a National Antimalaria Campaign having as its declared objective the eradication of malaria from Ecuador. This paper describes in some detail the progress achieved. Chief reliance has been placed on DDT residual spraying. The procedure adopted, including the training of personnel employed, is set out. In 1951–52, 155,147 houses were treated. In most of the coastal provinces one spraying a year is deemed sufficient. In certain areas and in the Andes provinces 2 sprayings a year are recommended. Unfortunately, available resources have been insufficient for this purpose. It is estimated that 90 per cent. of the population of Ecuador who are exposed to the risk of malaria infection have been given the protection that the spraying affords.

The large amount of statistical information adduced does not allow of an appraisal of the results hitherto achieved. There has certainly been a noteworthy reduction in the prevalence of the disease. In some places, however, malaria transmission continues in spite of treatment. The author considers that 2 more years of intensive effort will be necessary before the elimination of the disease may be possible by adequate treatment of remaining foci of infection. *Norman White*

Mukherjea, A. K. **Experimental Infection of Rhesus Monkeys with an Attenuated Strain of *Plasmodium knowlesi*.** *Ann. Biochem. & Exper. Med.* Calcutta. 1951, v. 11, No. 4, 219–34, 1 fig.

Ramakrishnan, S. P., Satya Prakash, Krishnaswami, A. K. & Mohan, B. N. **Studies on *Plasmodium berghei* n. sp. Vincke and Lips, 1948. X. A Critical Analysis of Experimental Mosquito Transmission.** *Indian J. Malariology.* 1953, Mar., v. 7, No. 1, 67–81, 1 coloured pl. & 2 charts. [18 refs.]

This paper represents determined attempts by workers in the Malaria Institute of India to transmit *Plasmodium berghei* by mosquitoes. Two strains of parasite were used (1) the old strain of Brumpt's and (2) a more recently isolated strain, and these were passaged 145 and 45 times respectively. *Anopheles stephensi* (type and var. *mysorensis*), *A. annularis*, *A. subpictus*, *A. culicifacies*, *A. splendidus*, *A. hyrcanus*, *A. jamesi*, *A. fluviatilis*, *A. pulcherrimus*, *Aëdes aegypti* and *Culex bitaeniorhynchus* were the species of mosquitoes used in the experiments. The animal hosts were albino mice and rats, wild rats, squirrels and hamsters. Mosquitoes were maintained between 75° and 87°F. at a relative humidity of about 70 per cent. All attempts to infect mosquitoes were unsuccessful with a single exception when sporozoites were found in one specimen of *A. stephensi*. All the conditions pertaining to the parasite and host were then critically examined to see if an explanation could be found for the negative [though curiously enough not for the single positive] results. Cytological studies showed that mature male and female gametocytes were present in both strains though exflagellation was never elicited and no zygotes were found in gut contents of fed mosquitoes. Gametocyte counts suggested that waves of these forms appeared at intervals of 3 or 4 days during the primary parasitaemia, but not during relapses. It was concluded that the gametocytes present in the infected animals were for some unknown reason functionally deficient.

[The paper is accompanied by a coloured plate which shows some typical males and females, presumably stained by J. S. B. stain, which is admirable for distinguishing gametocytes in that it does not overstain and that the sexes can be easily differentiated. In spite of this advantage, it would appear to the reviewer that certain of the parasites had been erroneously called sexual, but were in reality asexual, before division of the nucleus had taken place. They apparently contained no pigment and the males were the wrong colour. If this opinion is correct, it would explain some of the negative results. It is not clear from the text or tables on what day of the infection mosquitoes were fed on infected animals. The authors have logically based their time of feeding in accordance with actual counts of gametocytes. But, in fact, this is now known to be a bad guide, and the experiment might have been more successful if feeding had been done early in the infection (see Pérez-Reyes, below) quite irrespective of gametocyte density.]

P. C. C. Garnham

Pérez-Reyes, R. ***Anopheles aztecus* (Hoffman, 1935) a New Definitive Host for the Cyclical Transmission of *Plasmodium berghei* Vincke and Lips, 1948.** *J. Parasitology.* 1953, Dec., v. 39, No. 6, 603–4.

The Mukata strain of *Plasmodium berghei* was maintained in white rats by weekly blood passage, and the infection was transferred to hamsters by the inoculation of approximately 15 million parasites. The latter animals were subsequently exposed in a single cage to the bites of *Anopheles aztecus*,

A. quadrimaculatus and *A. albimanus*, for 2 hours every evening for a week. The species were later separated and the *A. aztecus* was maintained at 24°C. and the other two at 28°C., all at 70 per cent. relative humidity. *A. albimanus* proved totally insusceptible to infection, *A. quadrimaculatus* became insusceptible after 3 months of maintenance of the parasite in the author's laboratory, but *A. aztecus* remained susceptible throughout. The best time to infect this species was found to be on the 5th and 6th day after inoculation of the hamsters—on the 5th day 70 per cent. became infected, on the 6th, 50 per cent., and none by the 9th day. Some midguts showed more than 300 oöcysts. Sporozoites appeared (in *A. aztecus*) in the glands by the 14th day, when cyclical transmission was obtained by the intraperitoneal inoculation of mosquitoes into hamsters and 30-day-old white rats. *P. C. C. Garnham*

Escobedo, Rosa M. & Pérez Reyes, R. Acción del compuesto 1698L. en ratones infectados con *Plasmodium berghei*. [**Action of Compound 1698L on Mice Infected with** *P. berghei*] *Rev. Inst. Salubridad y Enfermedades Trop.* Mexico. 1953, Sept., v. 13, No. 3, 199–202, 1 graph.

The English summary appended to the paper is as follows:—

"The effect of compound 1698L of Lederle on *P. berghei* parasitaemia on mice is studied.

"The drug was administered at daily dosages ranging from 0·05 to 1·8 mg. per kg. body weight.

"The evolution of parasitaemia in the treated animals was very similar to that of the nontreated controls."

[The compound is a synthetic quinazolone preparation related to an alkaloid isolated from *Hydrangea* sp. See this *Bulletin*, 1953, v. 50, 91.]

Fulton, J. D. **Protozoal Infections and Diet.** [Correspondence.] *Lancet.* 1954, Jan. 16, 162.

The effect of a milk diet was tested on a number of protozoal infections in rodents. Suppression of *Plasmodium berghei* in mice kept on a milk diet was not achieved, possibly because of a seasonal alteration in the quality of the milk, and in rats suppression was incomplete as a rule. Accordingly, rats were placed on a special diet of amino-acids plus fats and carbohydrates; various vitamins were added or subtracted, and it was found that the addition of methionine resulted in parasitaemia in 6 out of 6 rats, the addition of *p*-hydroxybenzoic acid in 4 out of 5, but only 3 out of 6 rats given *p*-aminobenzoic acid showed parasites. Rats of 150 gm. weight on a milk diet were insusceptible to *P. berghei*; if cortisone in daily doses of 20 mgm. was administered, parasitaemia followed in approximately the same degree as in control rats on a normal diet. Animals on a milk diet and infected with *Trypanosoma rhodesiense*, *T. cruzi*, *T. congolense* and *Leishmania donovani* all developed normal infections. *P. C. C. Garnham*

Rodhain, J. Diète lactée et acide paraminobenzoïque dans l'infection due au *Plasmodium vinckei* chez la souris. [**Milk Diet and PAB in** *P. vinckei* **Infection in the Mouse**] *Ann. Soc. Belge de Méd. Trop.* 1953, Oct. 31, v. 33, No. 5, 459–61.

The author has shown previously [this *Bulletin*, 1954, v. 51, 144] that a milk diet was able to give total protection to mice against infection by

P. vinckei but only partial protection to the same hosts against the closely related *P. berghei* and no protection against *Babesia rodhaini*. The suppressive effect of milk diet in the first named infection has been confirmed in 4 mice and the result was reversed in a group of 3 mice by the addition of PAB to the milk in confirmation of the observation of Hawking [this *Bulletin*, 1953, v. 50, 1122]. *J. D. Fulton*

Josephson, E. S., Taylor, D. Jane, Greenberg, J. & Coatney, G. R. **Further Studies on the Effect of Antimalarial Drugs against Erythrocytic Forms of** *Plasmodium gallinaceum in Vitro*. *J. Infect. Dis.* 1953, Nov.–Dec., v. 93, No. 3, 257–62. [30 refs.]

In their earlier studies on *in vitro* testing of antimalarial activity [this *Bulletin*, 1951, v. 48, 873; 1952, v. 49, 674] the authors found that certain, but not all, established therapeutic agents were active at concentrations comparable with those present in blood during treatment. The variation in results was attributed partly to the fact that those with little activity *in vitro* affected the malaria parasite at a stage not present in culture, since in the experiments described growth did not proceed beyond that of the early schizont stage. The formation of active metabolites *in vivo* has also to be considered. The results obtained were used in classifying antimalarials according to their mode of action. The activity of a substance was based on the increase in prepatent period in young chicks inoculated with the treated parasites. Of the 15 substances tested, stilbamidine, a 7-chloro-4-aminoquinoline and 2 amino-substituted 2:4-diaminopyrimidines were active at low concentrations, the remainder, including some antibiotics, were without activity.

The following hypothesis is put forward as a lead to further investigation "All antimalarials which inhibit the parasite specifically during active reproduction are probably analogues of normal metabolites and resistance to them can be readily induced; antimalarials which inhibit the parasites at all stages of development are probably not analogues of natural metabolites and resistance to them cannot readily be produced." *J. D. Fulton*

Terzian, L. A. **The Effect of X-Irradiation on the Immunity of Mosquitoes to Malarial Infection.** *J. Immunology*. 1953, Oct., v. 71, No. 4, 202–6, 3 figs.

"1. It has been shown that the mosquito *Aedes aegypti*, in common with other insects, is extremely resistant to high doses of X-irradiation. Thus, the mortality did not reach 100% in the groups exposed to 40,000 r and 30,000 r until the twelfth and twenty-first post-irradiation days respectively, while in the groups exposed to 20,000 r the mortality was 95% on the thirtieth day. In the groups exposed to 10,000 r and 5,000 r the mortality was 28% and 18% respectively at the end of thirty days. It is to be noted that in non-irradiated, control colonies the mortality is 10% at the end of thirty days, and that the average life span of these laboratory mosquitoes is approximately forty-five days.

"2. It has been demonstrated that X-irradiation in doses ranging from 5,000 r to 30,000 r produces a significant increase in the innate resistance of *A. aegypti* to infection with the malarial parasite *Plasmodium gallinaceum*, and that this effect is quantitatively increased with increasing doses of X-irradiation.

"3. Finally, it has been shown that penicillin, and sulfadiazine, when

administered to X-irradiated mosquitoes prior to infection, are capable of reversing the effects on host immunity produced by exposure to X-irradiation and reestablishing what would appear to be a normal host-parasite equilibrium."

TRYPANOSOMIASIS

Unsworth, K. **Studies on *Trypanosoma vivax*. VIII. Observations on the Incidence and Pathogenicity of *T. vivax* in Zebu Cattle in Nigeria.** *Ann. Trop. Med. & Parasit.* 1953, Dec., v. 47, No. 4, 361–6, 1 map.

Fairbairn, H. **Studies on *Trypanosoma vivax*. IX. Morphological Differences in Strains and their Relation to Pathogenicity.** *Ann. Trop. Med. & Parasit.* 1953, Dec., v. 47, No. 4, 394–405, 1 chart. [40 refs.]

Unsworth, K. & Birkett, J. D. **The Use of Antrycide Pro-Salt in Protecting Cattle against Trypanosomiasis when in Transit through Tsetse Areas.** Reprinted from *Vet. Record.* 1952, June 14, v. 64, 3 pp., 1 map.

Unsworth, K. **An Outbreak of *T. simiae* Infection in Pigs in Nigeria and its Attempted Control using Antrycide Methyl Sulphate.** Reprinted from *Vet. Record.* 1952, June 14, v. 64, 2 pp.

Peel, E. & Chardome, M. Note préliminaire sur *Trypanosoma suis*, évoluant dans les glandes salivaires de *Glossina brevipalpis*. [**Preliminary Note on *Trypanosoma suis* in the Salivary Glands of *G. brevipalpis***] *Ann. Soc. Belge de Méd. Trop.* 1953, Oct. 31, v. 33, No. 5, 457.

Nowosielski-Slepowron, B. J. A. **An Experiment on the Control of Tsetse (*Glossina palpalis* R.-D.) in High Forest of West Africa.** *Bull. Entom. Res.* 1953, Dec., v. 44, Pt. 4, 703–10, 2 figs.

The following is essentially the author's summary:—

"Kumasi [the capital of Ashanti in the Gold Coast, West Africa] is a rapidly expanding township of about 80,000 inhabitants. This has led to an extensive building programme which has followed the ridges in the vicinity of the town, leaving the valleys in between potentially dangerous isolated habitats of *Glossina* [*palpalis*, *pallicera*, *nigrofusca* and possibly other species]. The danger from these isolated habitats is enhanced by the large numbers of itinerant labourers.

"The topography of the town and its surroundings is hilly; the vegetation is of semi-deciduous rain forest type, but with very thick secondary bush along most of the valleys in which the farms had been abandoned.

"The climate is remarkably equable with the rainfall showing periodicity but the percentage relative humidity is high and even throughout the year.

"The experimental clearing of an isolated habitat of *Glossina* [*palpalis*] in the Dechem valley was commenced in July 1950 and finished in March 1951. The clearing was of a discriminative nature, with cutting, stumping and burning of a strip of bush up to 20 ft. high and 250–300 yards wide along the stream, and a high reduction of fly population was achieved. This reduction was such that further clearings were planned.

"The reduction in fly population was assessed from fly-boy catches and from trap catches. These records showed that rainfall affected the catches.

"At the time of writing, about a sixth of the protective clearings planned around Kumasi have been completed, the fly population being reduced between about 80 per cent. and complete eradication.

"Kedjetia, one of the most dangerous valleys on account of its location, was cleared with such success that a complete eradication of *Glossina* [*palpalis*] was achieved.

"The clearing of the Dechem valley was followed by that of the Aboabo valley, thus rendering the eastern side of Kumasi practically vector free. The western and south-western sides of Kumasi will be protected by clearing now in progress on the Danyami stream.

"Clearing at the Regional College of Technology was carried out successfully and despite the fact that the College area is surrounded by a vast habitat of the fly [*palpalis*], the reduction achieved, as assessed from fly-boy and trap records, was about 90 per cent.

"It has been calculated that the cost of clearing one acre has been between £14 10s. and £25.

"The value of the clearing cannot yet be correlated with the decrease in cases of trypanosomiasis as the work is too recent, but if one can judge by tsetse reduction it will have preventative and protective value. The utilisation of the cleared valleys for farming and amenities by the local population will not only help to avoid costly maintenance but provide an added justification for clearing."

Wilson, S. G. **The Control of** *Glossina palpalis fuscipes* **Newstead in Kenya Colony.** *Bull. Entom. Res.* 1953, Dec., v. 44, Pt. 4, 711–28, 9 text figs. & 2 figs on pl.

Handcatching of tsetse flies failed to eradicate *Glossina palpalis* from an infested block on the main Kuja river, South Nyanza district, Kenya [this *Bulletin*, 1952, v. 49, 125]. It has now been recognized that this method has only a limited value and cannot be applied to extensive lake-shore infestations on islands or to heavy infestations along main rivers.

This paper gives an account of an experiment in total and discriminative clearance along the Yala, Magori and Nyando rivers and of DDT spraying on the fringing vegetation along the Mbogo and Ainamotua rivers. Methods and results are described and costs given.

Riverine clearings along the Yala and Magori rivers were successful even when the original infestations were heavy, though the decrease was only gradual and some months elapsed before the effects were fully evident. In some places the number of flies increased when operations ceased and it was found that proper isolation from infested areas had not been achieved. It was felt that something more than mere bush-clearing and burning was necessary, such as the establishment of grassland along the banks with human settlements; but settlements are difficult in narrow areas where the land is stony and unsuited for continual cultivation.

Discriminative clearing proved to be as expensive as total clearing because regeneration had to be frequently checked. Success depended so much on rapid and complete burning of the bush after cutting and this could not always be arranged in areas where heavy rains occurred. The cost of maintaining the clearings varied from £200 per mile on the Yala river to £350 per mile on the Magori river. The two main difficulties were in obtaining sufficient labour and the expense; because of these the early work was threatened with failure.

The use of DDT gave new hope; 5 per cent. DDT was sprayed on the fringing vegetation along 20 miles of the Mbogo river and gave such dramatic results that *G. palpalis* was eradicated at a cost of £42 per mile. The rate of application was 15 to 20 lb. of DDT per acre and the residual effect lasted for at least 14 days in dry weather but was rapidly lost during the rains.

Work on the Ainamotua river was slow and more difficult, nevertheless eradication appears to be in sight and expenses have been low. The policy now is to continue spraying along the Ainamotua until eradication is achieved and then to attack the Nyando river until the whole area is covered. As with all methods, areas under treatment must be well isolated from areas infested by tsetse and it is hoped to achieve this along the Nyando, for some places are entirely free from *G. palpalis* owing to dense cultivation; this will isolate the areas to be treated and spraying should lead to elimination of the fly. *H. S. Leeson*

Thompson, B. W. **Aircraft Applications of Insecticides in East Africa. III. Atmospheric Turbulence in Woodland.** *Bull. Entom. Res.* 1953, Dec., v. 44, Pt. 4, 611–26, 7 figs.

This paper describes meteorological observations bearing on the problem of efficiently distributing insecticidal aerosols through African woodland or thicket to kill tsetse. The site chosen was a block of natural and little disturbed woodland in Northern Tanganyika, comprising chiefly *Acacia xanthophloea* with scattered *Acacia usambarensis*. Tree density and canopy height (19–20 m.) were very uniform. The canopy was mainly composed of small leaves, allowing some 30–40 per cent. penetration of sunlight. Undergrowth varied, but averaged 1–2 m. in height and was generally dense.

The observations recorded were temperature and anemometer readings at 2·5, 5, 10, 12·5, 15, 17·5 and 20 m. (canopy height) and also at 5 m. above that. Simultaneous readings could be made on the clear ground at an airfield a mile away, at 2·5 and 10 m. with calculated values for 25 m. Traces were also obtained with an instrument recording wind changes in two dimensions.

A table of wind speed data for September 1951 is given, together with the lapse rate. It is shown that the woodland slows the air stream, so that even 5 m. above the canopy, the wind is usually only 50 to 80 per cent. of the speed 5 m. from clear ground.

An even bigger reduction occurs at canopy level, where the wind declines to 40–20 per cent. of the speed 5 m. above. In both cases the reduction is greatest with light winds (below 6 feet per second in the open) than with stronger winds. In the wood below the canopy the wind speed declines further, but much more slowly, towards the ground. The wind speed at 10 m. in the wood was related to the outside wind speed at the airfield, but the correlation was only approximate.

Observations throughout July gave less than 1 per cent. records of absolute calm at any time of day or night. Both inside and outside the woodland the wind fell at morning and evening. Throughout the day, the air speed at 10 m. inside the wood averaged about 3 feet per second [f.p.s.] despite considerable variation outside (12–18 f.p.s.).

The temperature records throughout the day at 2·5 and 10 m. showed the contrast in the gradients at the airfield and in the wood. In the open there was sharp inversion at morning and evening with super-adiabatic lapse rate during the day rising to a peak at 14.00 hours. In the wood there was little departure from the adiabatic, except for some inversion in the evening.

More detailed records from the wood showed complex, gentle mixing of air beneath the canopy, due to alternate rising of hot air and slumping of cool air.

Some of the traces recorded with bi-dimensional wind vane are reproduced. The form of the traces can be roughly classified according to wind speeds of 2, 2·5 to 4 and 4 f.p.s. Gentle winds (up to 2 f.p.s.) produce mainly parallel traces indicating lamellar air flow, due to convection currents up or down. With the 2 other categories, the irregular traces reflect turbulence, due to wind eddies through the trees, which obliterate the gentle convectional movements.

Certain conclusions were drawn from behaviour of smokes released in the woodland. It was noted that good spread and mixing could only occur with low outside wind speeds. Applications from air and ground should both be effective, under these conditions; but air applications would be hindered by dense canopy, ground applications by very light canopy. It was observed that convection currents, displacing air from clearings in the wood during the day, tended to draw smoke from the surrounding wood towards the clearing. *J. R. Busvine*

Hocking, K. S., Parr, H. C. M., Yeo, D. & Anstey, D. **Aircraft Applications of Insecticides in East Africa. IV. The Application of Coarse Aerosols in Savannah Woodland containing the Tsetse Flies** *Glossina morsitans* **and** *G. swynnertoni*. *Bull. Entom. Res.* 1953, Dec., v. 44, Pt. 4, 627–40, 4 figs.

Earlier papers in this series have given results of aerial spraying against *Glossina palpalis* and *G. swynnertoni* in E. Africa [this *Bulletin*, 1954, v. 51, 31, 32]. This paper describes a similar work against *G. morsitans* (and *G. swynnertoni*) in Tanganyika. The site chosen consisted of blocks of infested woodland, each of a few square miles, on the eastern slopes of the Masai escarpment. An irregular block in the south was treated with BHC and about 1 to 2 miles north of this a somewhat more compact block was treated with DDT; about 1,000 yards north of this again, was untreated woodland, used as a control. Between the blocks were clearings, but it is not thought that the isolation of either block was complete.

The type of vegetation present is described and characteristic zones are shown on maps of the site. Both blocks harboured game and tsetse. Preliminary marking and recovery trials gave the following estimates of the numbers of non-teneral males:—*G. morsitans*: north 8,000, south (?); *G. swynnertoni*: north (?) 350, south 5,000. Females were probably about twice as numerous.

The insecticides were both applied as 10 per cent. solutions in a mixture of 1 : 4 furnace oil and kerosene. The DDT contained 80 per cent. *p,p'*DDT and the BHC contained 12 per cent. *gamma* isomer. They were applied as aerosols produced in aeroplane exhausts as described in the first paper in this series. Nominal dosage was 0·25 gallon/acre (equivalent to 0·2 lb. *p,p'*DDT or 0·03 lb. *gamma* BHC). The aerosol droplets ranged from 4 to 250 μ with a mass mean diameter of 90 μ. The output fell steadily as the tank emptied, so that the first swathes were more heavily treated than the last. To compensate for this, the area treated by the next sortie was made to overlap the last quarter of the previous one. Only the early morning weather conditions were suitable for air-spraying and even with 2 aircraft the 15 sq. miles of the 2 blocks required 14 sorties which took 11 to 12 days.

Eight applications were made at intervals of 2 weeks. Their effects were judged by regular fly rounds starting 2 months before the trial and continuing until a year afterwards (2 years in the south block).

Very substantial reductions were achieved, flies being nearly eradicated from the N. block for a short period. In the other block the reduction was not quite so great, but it was considered that this was not due to ineffectiveness of the BHC, but to a combination of circumstances which made treatment of the S. block more difficult. After the trial, flies in the N. block remained low, only rising to about 5–15 per cent. of the pre-treatment numbers at the end of the year. In the S. block the numbers of flies remained in the region of 10 per cent. of the initial value for the first year and gradually declined further in the second.

Flies in the control block decreased somewhat during the treatment period, then rose considerably and fell again to about the original level in the year after the trial.

These results were encouraging, and even better results could be expected if the following defects of the treatments were remedied: (1) uneven rate of emission of insecticide; (2) airfield too far from the site; (3) too wide a drop-spectrum in the aerosol. *J. R. Busvine*

LEISHMANIASIS

Chung, Huei-lan. **A Résumé of Kala-Azar Work in China.** *Chinese Med. J.* Peking. 1953, Nov.–Dec., v. 71, No. 6, 421–64, 2 figs. on 2 pls. [142 refs.]

Vargues, R. & Raffi, A. Intérêt de la fiche réticulo-endothéliale de Sandor dans le diagnostic, le pronostic et le contrôle thérapeutique du kala-azar infantile. [**The Value of the Reticulo-Endothelial Pattern of Sandor in the Diagnosis, Prognosis, and Control of Treatment of Infantile Kala Azar**] *Bull. Soc. Path. Exot.* 1953, v. 46, No. 2, 222–30, 1 chart.

It has long been appreciated that there are important changes in the blood proteins in kala azar. The usual methods of showing these changes, such as the reactions of the Gaté-Papacostas type, are purely qualitative. The electrophoretic method requires delicate and expensive apparatus. Thanks to Sandor (*Ann. Inst. Pasteur*, 1950, v. 79, 130) we have a more practical method of great value for fractionating the proteins in kala azar.

The requirements are 0·9 ml. of serum, a phosphate buffer of *p*H 7·6, N/20 HCl, haemolysin tubes, a set of graduated pipettes, a nephelometer (*e.g.*, of the Vernes type) and an instrument for measuring the hydrogen-ion concentration.

Into each of 9 tubes is measured 0·1 ml. of serum and 2 ml. of phosphate buffer; no more is added to tube 1, but to tubes 2 to 9 the hydrochloric acid is then added in increasing quantities, 0·05, 0·10, 0·15, 0·20, 0·22, 0·25, 0·27 and 0·30 ml. Each tube is shaken and allowed to stand for half an hour, after which the optical density and the *p*H of each tube are measured. The results are plotted on a graph; the opacity is shown in degrees of the Vernes scale.

The curve for normal serum starts from the base line at *p*H 7·6 and rises slowly to a peak of about 60 degrees at *p*H 5·8 and falls at about the same rate to the base line between *p*H 4 and 5. In kala azar the value at *p*H

7·6 is high [30 degrees on the smoothed curve shown and a mean of 70 degrees in the examples given] and it rises rapidly to a peak of 150 or more between *p*H 6·6 and 6·3 and then falls rapidly and crosses the normal curve.

The high values at *p*H 7·6 indicate the presence of the abnormal slowly moving gamma globulin of the electrophoretic method; this is called " euglobulin I_1 " by Sandor. From this point to the peak at about *p*H 6·5 the kala azar curve shows the great increase in the normal gamma globulins and indicates the " alcalinization " of the curve. The rapid fall of the curve shows the relative diminution of alpha globulins.

The reticulo-endothelial pattern which this curve reveals is of value in diagnosis, prognosis, and the control of treatment. Confusion with other conditions that show an increase in globulin such as hepatic cirrhosis, is not likely to occur since in such conditions the serum does not show the same characters, but malaria is liable to do so; however, in the latter case the pattern varies from day to day.

The authors give an example of the value of the pattern in diagnosis of kala azar. This was a case in which earlier parasitological examinations, spleen, and marrow punctures, were negative; the reticulo-endothelial pattern showed a great increase in euglobulin I_1, and a peak at *p*H 6·6; eventually parasites were found in the marrow; and a course of Glucantime produced a cure. A second case demonstrated the value in prognosis; a frank clinical case of kala azar with cancrum oris gave a negative result in the first tube (*p*H 7·6). This indicates a complete failure of immunity response and a fatal termination was inevitable.

After successful treatment the typical kala azar pattern returns to normal in a period of about 4 months; the changes are regularly progressive and are a valuable indication that relapse is unlikely to occur. [The authors' observations run parallel to those of Lloyd, Napier and Paul, this *Bulletin*, 1929, v. 26, 744.]

The presence of euglobulin I_1 is the chemical expression of a generalized macrophage reaction. Sandor considers that the abnormal protein is derived from the disintegration of the protoplasm of the macrophages.

L. E. Napier

Chatterjee, B. B. & Hagen, K. **Findings in 679 Cases of Kala Azar in Santal Parganas.** *Indian Med. Gaz.* 1953, Apr., v. 88, No. 4, 214–23, 5 figs.

At a hospital in the Santal Parganas, near the border of West Bengal, in 5½ years 679 patients with kala azar were treated as in-patients, and probably about twice this number as out-patients. Some data from the former cases have been analysed. An interesting epidemiological observation was that during the period the hospital was moved further away from the Bengal border; after this move the total number of kala azar cases decreased from 10·5 per cent. to 4·5 per cent. of total admissions, but the percentage of " early or acute " cases increased from 5 per cent. to 25 per cent. [The authors suggest they may happen to have located the hospital at a local focus of the disease, but another explanation might be that the disease is spreading up the Bihar plateau; these two suggestions are not mutually exclusive.]

The peak of the admission curve was in April with a second lower peak in October, whereas the onset curve showed the highest level in September and October. The highest age incidence was in the 20–25 quinquennium and only 13 patients (1·9 per cent.) were under 5 years of age. The sex distribution showed a very slight male predominance.

The diagnosis was largely based on 4 " basic criteria ", chronic fever, splenomegaly, leucopenia, and a positive aldehyde or antimony test. Fever was noted in 97·5 per cent., splenomegaly in 92, hepatomegaly in 29·7, symptomatic anaemia in 37·5, cough in 16·5, diarrhoea in 15·6, oedema in 13·5, and haemorrhages in 6·2 per cent.; other less frequent symptoms included headache, ascites, asthma, stomatitis and cancrum oris (in 2 cases only).

The average haemoglobin percentage (Sahli) was 42 and the average leucocyte count was 3,750 per cmm.: only 22·5 per cent. had counts below 3,000 and 27·7 per cent. were above 5,000. In 3 cases the count was below 1,000 per cmm.; all were fatal. Albuminuria was found in 16·5 per cent.

The treatment given was urea stibamine, 0·15 to 0·20 grammes, twice a week, intravenously with Stibatin, 0·30 to 0·35 grammes, on the remaining days, intramuscularly. The average total dose of the combined drugs was 4·5 grammes for adults. The temperature fell to normal on the ninth day (average). The death rate was 5·5 per cent., and the authors believe that not more than 2 to 3 per cent. relapsed, but there was no systematic follow-up.

[The authors refer (twice) to kala azar as a " kaleidoscopic " disease; practically all diseases show widely varying clinical manifestations, but in the opinion of the reviewer, kala azar is, comparatively speaking, a remarkably constant disease in any one population.] *L. E. Napier*

ZUCKERMAN, A. **Initial Reaction to the Subcutaneous Inoculation of Cultures of *Leishmania tropica* in the Hamster.** *Acta Med. Orientalia.* 1953, July–Aug., v. 12, Nos. 7/8, 238–40.

The author describes the results of experiments designed to study the cellular reactions of the host's tissues to infection with *Leishmania tropica*. Cultures (0·1 ml.) of this flagellate were inoculated subcutaneously into golden hamsters (*Mesocricetus auratus*), and nodules at the site of injection were excised at intervals from 3 hours to 20 days from the time of inoculation. The exudate and teased-up tissues (stretch-preparations), which were smeared on slides, were dry-fixed and stained by Giemsa's method. The sequence of events revealed in the preparations was as follows. At the beginning (3 hours) there are numerous extracellular leptomonads, some of which are normal but many degenerating. During this period abundant heterophile leucocytes are actively phagocytosing the flagellates, but by the 2nd day these leucocytes disintegrate and gradually disappear. They are replaced by mononuclear agranulocytes, polyblasts and macrophages, which contain normal Leishman-Donovan bodies. Leishmanial forms are also observed in fibroblasts of the subcutaneous connective tissue. Up to the 3rd day the parasites in these cells are being phagocytosed, but from the 4th day onwards they retain the normal appearance of intracellular leishmanias.

The initial destruction of the inoculated leptomonads is regarded as evidence of innate immunity in the host. The inoculum (parasites plus culture medium) provokes an inflammatory response in which a heterophile exudate is succeeded by a lymphoid cell exudate. Though various types of host-cells may contain parasites—intact or in different stages of disintegration—the Leishman-Donovan bodies establish themselves and continue to develop only in the lymphoid cells, especially in the macrophages.

C. A. Hoare

Vargas, L. & Díaz Nájera, A. Flebótomos comunes a México y a los Estados Unidos. [*Phlebotomus* **Species Common to Mexico and the United States**] *Bol. Oficina Sanitaria Panamericana.* 1953, Nov., v. 35, No. 5, 494–8. [16 refs.]

The English summary appended to the paper is as follows:—

"There are 23 known species of *Phlebotomus* in Mexico at the present time. Of these, the following six species are found in the United States: *anthophorus, diabolicus, shannoni, stewarti, texanus* and *vexator.* The *shannoni* species has the widest geographical distribution, being found from North Carolina and Alabama to Brazil. Both the *shannoni* and *diabolicus* species attack man. One case of leishmaniasis ulcer has been reported in Texas. All cases described in Mexico have occurred in the southern half of the country."

Floch, H. & Sureau, P. Le "pian-bois" en Guyane Française. Note préliminaire. ["*Pian-bois*" **in French Guiana: a Preliminary Note**] *Bull. Soc. Path. Exot.* 1953, v. 46, No. 3, 297–9.

In Cayenne, 83 cases of leishmaniasis were diagnosed clinically and in 623 examinations 44 specimens showed *Leishmania brasiliensis*, during a period of 13 years. There is, however, evidence that in the interior of French Guiana the disease is more common than these figures suggest. At the Pasteur Institute of French Guiana, 61 local species of *Phlebotomus* have been differentiated. In 1952 there was an unusually large number both of cases of *pian-bois* and cases diagnosed as leishmaniasis. Lesions of the mucosa are rare but do occur. In French Guiana the mucous lesions are characteristically like the uta of Escomel [this *Bulletin*, 1929, v. 26, 750], but according to that author such lesions usually occur in the mountainous regions, whereas espundia occurs in the low humid forest regions like those of French Guiana.

Pian-bois gives rise to immunity although this is slow to develop.

The authors have found that leishmaniae are usually easy to find in the early lesions; later they still persist but are more difficult to find. They are most easily found in the clear serum that is obtained by puncturing the living edge of the ulcer.

Many of the members of a mission that visited a thinly populated part of the interior developed *pian-bois*; all the Europeans and Cayennese creoles developed lesions, whereas the creoles from the country district did not, probably because they had acquired immunity from previous infection. It is thought that the reservoirs of infection must be some local animal; the agouti is suspected. It is thought improbable that sandflies are attracted to the lesions in these animals, and it is suggested that they suffer from a generalized infection.

The treatment used at first was anthiomaline intravenously or Glucantime intramuscularly, daily; however in one case a complete healing of the ulcers was obtained after a course of 10 injections of the latter drug, but several weeks later in France a second ulcer appeared several centimetres from the scar of the first. Abundant leishmaniae were found in this. The authors consider that the parasites responsible for the second lesion were, at the time of the first lesion, isolated by the tissue reaction and resisted the local concentrations of the drug sufficiently to prevent a cure, up to the cessation of treatment, which in this particular case had consisted of 3 injections at intervals of one week, in the place of daily injections; with daily injections, whatever the salt of antimony used, the maximum tolerated dose is rapidly reached. *L. E. Napier*

Casile, M. & Saccharin, H. A propos du traitement de la leishmaniose américaine. [**On the Treatment of American Leishmaniasis**] *Bull. Soc. Path. Exot.* 1953, v. 46, No. 2, 184–8.

In French Guiana, forest leishmaniasis is known as *pian-bois*; only 3 or 4 cases are encountered annually at the hospital at Cayenne, but it is apparently more common in the country districts. The diagnosis is usually made on clinical grounds supported by the results of treatment with antimony preparations. Mucous membranes are rarely involved.

Lithium antimony thiomolate [anthiomaline] and N-methylglucamine antimoniate [Glucantime] are mainly used; of these the former [a trivalent antimony preparation] is the most effective. The average stay in hospital was 44 days, but in some recent cases only 15 to 20 days and in those with mucous lesions as much as 70 days.

This present communication is made primarily to report 2 cases in which streptomycin plus sulphonamide treatment had a striking effect.

The first patient was a Guianese creole aged 25 who had multiple cutaneous lesions; the lesions were typical *pian-bois* clinically but no parasitological diagnosis was made. The man also had gonorrhoea for which streptomycin (1 gramme daily) and Thiazomide (6 grammes daily) were given for 5 days, without antimony. The cutaneous lesions cleared up within 5 days of the completion of treatment.

The second patient was a European aged 29 in whom the diagnosis was confirmed parasitologically. He had received 3 months' local treatment and later antimony thiomalate without benefit. The lesions healed in 15 days after treatment by streptomycin, Thiazomide, and placental extract injections. *L. E. Napier*

Sen Gupta, P. C. **Chemotherapy of Leishmanial Diseases: a Resume of Recent Researches.** *Indian Med. Gaz.* 1953, Jan., v. 88, No. 1, 20–35. [Numerous refs.]

FEVERS OF THE TYPHUS GROUP

v. Bormann, F. Zur Epidemiologie des Wolhynischen Fiebers und des klassischen Fleckfiebers ausserhalb der Notzeiten. [**The Epidemiology of Typhus Fever in the Absence of Conditions of Distress**] *Med. Klin.* 1954, Jan. 22, v. 49, No. 4, 140–43. [12 refs.]

The author discusses in a clear and able manner the problems connected with the carry-over of infection of trench fever and typhus fever during inter-epidemic periods when infection appears to have died out. The rickettsiae of trench fever are known to be capable of survival in the human body for years after attacks and in normal times symptomless or unrecognized attacks are believed to maintain the chain of infection for indefinite periods. In many places in which the disease is smouldering the doctors are ignorant of its presence so that when epidemics occur they seem to arise *de novo*.

Rickettsiae prowazeki, on the other hand, persists in the body no longer than the period of the fever or of symptomless attacks so that human beings cannot act as persistent reservoirs of infection. The organisms, when of low virulence, can survive in infected lice as long as 3–4 months so that persons recently attacked may be capable of introducing infection to people

with whom they come in contact even though they themselves are free from infection. Gipsies and other vagrants often convey infection to distant places but when the inhabitants are free from louse infestation the only result is the occurrence of sporadic attacks or small temporary outbreaks. The author is strongly opposed to the view that delayed relapses of the Brill type ever occur. He has already stated his reasons for this view in a previous paper [see this *Bulletin*, 1953, v. 50, 295]. He promises to controvert the arguments brought forward by Mooser and others in support of the hypothesis of late relapses. *John W. D. Megaw*

Seibold, F. X. Beitrag zum Problem des Fleckfieberrezidivs (Brillsche Krankheit). [**The Problem of Relapsing Typhus Fever (Brill's Disease)**] *Deut. med. Woch.* 1954, Jan. 22, v. 79, No. 4, 144–6, 1 fig. [19 refs.]

A patient who had a clear history of an attack of typhus fever in April 1944, suffered from a second attack in September 1952, in which the diagnosis was confirmed by a Weil-Felix reaction with a titre rising from 1 in 100 on the 12th day to 1 in 3,200 on the 21st day. In later tests the complement-fixation reaction was positive at 1 in 12,800 on the 36th day when the rickettsia-agglutination reaction with both classical and murine antigens was positive at 1 in 1,280. On the 52nd day the agglutination reaction with classical antigen was still positive at the same titre but the reaction with murine antigen had fallen to 1 in 160. The patient was free from louse infestation and the possibility of a fresh infection was regarded as being excluded, so the case was considered to be one of a late relapse of typhus fever of the Brill's disease type. *John W. D. Megaw*

Mohr, C. O., Good, N. E. & Schubert, J. H. **Status of Murine Typhus Infection in Domestic Rats in the United States, 1952, and Relation to Infestation by Oriental Rat Fleas.** *Amer. J. Pub. Health.* 1953, Dec., v. 43, No. 12, 1514–22, 5 figs. [17 refs.]

The number of cases of murine typhus reported in the U.S.A. in 1944 was 5,338; the actual number was believed to be about twice as great.

In 1945 a country-wide campaign of control was started; this included disinfestation of rats and their burrows with DDT, rat proofing of houses and rat destruction. At the same time a survey of the degree of rat infection and infestation was undertaken. During 1945 about 45 per cent. of the rats caught in the affected areas gave positive complement-fixation reactions for murine typhus; by 1952 the rate had fallen to 6·7 per cent. The number of human cases reported in 1951 was 423—less than 12 per cent. of the number reported in 1944. The geographical range of infected areas remained much the same.

In the survey from 1951 onwards it was found that in farm premises and isolated buildings rat infection was rare in areas with average January temperatures of less than 40°F. In similar premises in areas with average January temperatures of 47°F. or over, combined with high humidity, infection was widespread; with these climatic conditions the disease was formerly common in urban areas but successful measures of control have almost eliminated infection. In some localities like central and southern Florida and the Los Angeles region rats in farms were not often infected because the higher winter temperatures were accompanied by aridity. In urban areas rats may be infected in localities further north with average

January temperatures of less than 40°F. but although central heating provides conditions favourable for oriental rat fleas, control is easy and infection is uncommon. Where the January temperature is between 40° and 45°F. the distribution of infection is patchy, being associated with an irregular distribution of oriental rat fleas and rat lice.

John W. D. Megaw

Paterson, P. Y., Wisseman, C. L., Jr. & Smadel, J. E. **Studies of Rickettsial Toxins. I. Role of Hemolysis in Fatal Toxemia of Rabbits and Rats.** *J. Immunology.* 1954, Jan., v. 72, No. 1, 12–23, 1 fig. [25 refs.]

This is a description of a series of highly elaborate experiments which obviously have called for exceptional standards of technical skill on the part of the authors. The object of the research was to study the effects of intravenous injections of the toxins of *Rickettsiae mooseri* in rabbits, rats and mice. The toxins were prepared from yolk-sac cultures of the Wilmington strain from which washed suspensions of the rickettsiae were obtained and titrated in terms of the LD50 dose for each species of animal. These doses were 5 times greater per unit of body weight for rats than for mice.

Rabbits receiving 4 LD50 doses became weak and restless within 10 to 15 minutes and died in convulsion within about 60 minutes; after 1 or 2 such doses the effects were either similar, except for slightly longer survival, or there was delayed quiet death after 120 to 240 minutes.

A group of 6 rabbits received 4 LD50 doses; all of them developed haemolysis with rapidly increasing plasma haemoglobin, reaching an average amount of 2,085 mgm./100 ml. before death, which occurred within 60 minutes. There was also a great and rapid increase in the plasma potassium content (hyperkaliaemia).

One group of 6 rabbits receiving 1 to 2 LD50 doses died "relatively early" [the chart suggests 70–80 minutes]. The increase in plasma haemoglobin and plasma potassium was rather less and occurred more slowly.

Another group of 6 rabbits receiving 1 to 2 LD50 doses survived much longer—120 to 270 minutes. The increase in the plasma haemoglobin was slower and less in degree than in the previous group, but was considerable; it reached almost the maximum degree within 60 minutes and then remained almost constant till death. The plasma potassium level remained within the normal range for 120 to 180 minutes, then rose rapidly just before death which thus appeared to be much more closely associated with hyperkaliaemia than with haemolysis. Among the other changes observed were certain abnormalities in the electrocardiographic tracings and a pronounced fall in the blood pressure in most cases.

In similar experiments on rats and mice the toxin in doses of 4 LD50 seldom caused death before 60 to 120 minutes; the animals developed no obvious haemolysis or increase in the plasma potassium, but showed a pronounced degree of haemoconcentration indicating a high degree of damage to the capillary walls.

The striking variations in the effects produced in different animals show the desirability of employing several species of experimental animals in such studies.

Full details of the findings and of the complicated technical methods will be found in the paper.

John W. D. Megaw

Jo, K. **On the Transmission of Antibodies from Mothers to their Offsprings in Experimental Typhus Fever, Experiments in Albino Rats and Guinea Pigs.** *Japanese J. Med. Sci. & Biol.* 1953, June, v. 6, No. 3, 299–310, 1 fig. [17 refs.]

Groups of female rats or guineapigs were immunized against murine or epidemic typhus with live or killed rickettsiae, and repeated complement-fixation tests were made of their sera and the sera of their offspring from the time of parturition.

Four rats were inoculated intraperitoneally with living *Rickettsia typhi* [*R. mooseri*], 2 of them before, and 2 during, pregnancy. Antibodies were found in the mothers and offspring at the time of birth; the mothers had titres of 1 in 160 to 1 in 1,280; the offspring had titres of 1 in 40, rising to 1 in 80 to 1 in 320 during the first 3 weeks and falling to zero by the 6th to the 8th week. The offspring of 3 rats immunized in the same way were suckled by normal foster mothers; antibodies were found in the offspring at or soon after birth at titres reaching 1 in 40, but after 3–4 weeks none was found.

The offspring of 3 healthy rats were suckled by foster mothers that had been immunized in the same way. Within a week antibodies appeared in the sucklings; the highest titres—1 in 40 to 1 in 80—were reached in the 2nd week; zero was reached after 7 weeks.

These experiments showed that maternal antibodies of rats were transmitted to the offspring by the placental route and also by milk. Corresponding experiments on guineapigs showed that in them transmission was by the placenta and not by milk.

Details of these and other experiments will be found in the paper.

John W. D. Megaw

Katsura, S. **Ilotycin (Erythromycin) Treatment of Experimental Tsutsugamushi Disease in Human Being.** *Acta Med. et Biologica.* Niigata. 1953, Mar., v. 1, No. 1, 1–6.

The author describes the results of treatment of 9 patients who had experimentally-produced attacks of tsutsugamushi disease. The drug used was a new antibiotic called Ilotycin (erythromycin) discovered and issued by the Eli Lilly Research Laboratories; it is stated to be a product of a strain of *Streptomyces erythreus* and to have been found effective against rickettsiae and large viruses in animals and yolk-sac cultures.

A group of 5 patients were first treated with chloramphenicol, aureomycin or terramycin [oxytetracycline] from the onset of the fever. In 4 of the cases the dosage was 250 mgm. every 12 hours to a total of 1·5 gm.; in the 5th case these amounts were doubled. The patients "immediately became nonfebrile" but all of them relapsed within 3–7 days. About 7 days after the end of this course of treatment erythromycin was given in doses of 300–500 mgm. every 6 hours, the total dosage ranging from 2 to 6·5 gm. In every case the temperature fell to normal in 12 to 14 hours and no further relapse occurred.

One patient vomited after taking the 4th dose of 500 mgm.; the patient had chewed the tablets before swallowing them. No other side effects were observed.

[Erythromycin has obviously much the same effect as the other antibiotics mentioned above. A suitable system of dosage for all these drugs has still to be worked out.] *John W. D. Megaw*

Giroud, P., Boidé, D. & Le Gac, P. L'épidémiologie de la fièvre Q. [**Epidemiology of Q Fever**] *Rev. d'Hyg. et de Méd. Sociale.* Paris. 1954, v. 2, No. 1, 11–24. [33 refs.]
A general review and discussion.

Patočka, F. & Kubelka, V., in collaboration with Z. Mandlíkové. Studie o Q rickettsiose I. [**A Study of Q Fever: I**] *Československ. Hyg., Epidemiol., Mikrobiol.* Prague. 1953, v. 2, No. 5, 340–52, 1 chart & 4 figs. on 2 pls. [28 refs.] English summary.

Complement-fixation tests for Q fever were carried out with antigens prepared by the Topping-Shepard and Urbach methods, and also by a modification developed by the authors, in which yolk-sacs infected with *Rickettsia burneti* were frozen and twice extracted with ether. Positive reactions with titres between 20 and 80 were obtained with 19 of 139 human sera, including 4 of 34 laboratory workers and 7 of 8 patients suspected of having Q fever. Antibody was also present in the sera of 3 of 10 sheep kept near the laboratory. The results show that Q fever occurs in Czechoslovakia. *D. J. Bauer*

Tendeiro, J. **Febre Q.** [Q Fever]
This book was reviewed in this *Bulletin*, 1953, v. 50, 1186.

YELLOW FEVER

García Solórzano, E. La fiebre amarilla en el Ecuador. [**Yellow Fever in Ecuador**] *Rev. Ecuatoriana de Hig. y Med. Trop.* Guayaquil. 1953, v. 10, Nos. 1/2, 1–6, 2 maps. [14 refs.]

This is a general account of yellow fever in Ecuador and of the success of measures undertaken for its eradication. The last case of urban yellow fever was in Guayaquil in May 1919. In September 1951, a portion of liver sent to Bogotá from Calceta was declared as positive and there was a possibility that it was a case of sylvatic yellow fever or of poisoning by carbon tetrachloride administered for helminthiasis. In Ecuador sylvatic yellow fever was proved in June 1949, in an outbreak among workers in the Shell Company, at Lorocachi, where 11 deaths occurred among 32 attacked. Sections of liver from 3 of the fatal cases were sent to Bogotá and one was reported as positive for yellow fever.

In 1918 measures were undertaken to eradicate *Aëdes aegypti* from Ecuador and until 1945 the Health Service maintained an antilarval squad of inspectors. Then, owing to the growing danger from reported foci of sylvatic yellow fever and the number of non-immunes in Ecuador, weekly domiciliary visits were made in Guayaquil to discover foci of larval *Aëdes aegypti* and to distribute DDT. In 1948, of 182 places visited the mosquito was found in 130 (71 per cent.); in 1949 in 108 out of 176 (61·3); in 1950 in 86 among 319 (26·9); in 1951 in 11 out of 1,325 (0·8) and in the first 7 months of 1952 none among 380 visited. A second table is even more instructive, showing in 5 districts the conditions before measures were adopted and comparing them with those after. Of 729 localities visited in Guayas 179 (24·5 per cent.) were positive before the campaign was started; in El Oro 47 among 328 (14·3); in Esmeraldas 28 out of 84 (33·3);

in Los Rios 21 out of 777 (2·7) and in Manabí 61 out of 465 (13·1). After the campaign was started all 5 districts were reported negative.

To sum up: in the total 2,383 places examined 336 (14·1 per cent.) were positive before the campaign against *Aëdes aegypti*, whereas after it, all were negative. Sylvatic yellow fever is present in the Napo Pastaza province and occasional cases occur in the mountainous regions west of the Andes. *H. Harold Scott*

Eklund, C. M. Encefalitis infantil en Costa Rica y Honduras después del empleo de la vacuna Dakar contra la fiebre amarilla. [**Encephalitis in Children in Costa Rica and Honduras following the Use of Dakar Yellow Fever Vaccine**] *Bol. Oficina Sanitaria Panamericana.* 1953, Nov., v. 35, No. 5, 505–16. English summary (5 lines).

An interesting series of cases of encephalitis carefully studied. In 1951 cases of acute encephalitis occurred among children in Costa Rica and in Honduras; 13 such were observed in Costa Rica, 9 of them quite definite and 4 very probable, and in Honduras 1 definite and 1 possible. They were among persons who had been inoculated by scarification against yellow fever, samples of the Dakar vaccine being used. In Costa Rica the onset occurred " between the 9th September and the 26th October, that is to say a period of 14 days ". [This is obviously incorrect, being 47 days, but there is no clear indication elsewhere whether these dates are themselves wrong.]

Different batches of the vaccine were used, designated A-26, A-40, A-45, A-47 and A-52. Of these A-40 was chiefly incriminated and symptoms appeared between 10 and 22 days after the vaccination, with headache, general pains and fever. Generally, children under 10 years of age reacted most strongly to the vaccination; thus, of 16 children under 10 years, 8 gave a severe reaction, 6 a moderate and only 2 a mild reaction. Among 7 persons in their second decade there were no serious reactions; 3 were moderate and 4 mild; between 20 and 30 years, 1 severe, 3 moderate and 4 benign among 8 vaccinated, and of 9 above the age of 30 years 7 reacted mildly, and 1 each moderate and severe.

In Costa Rica all the cases of encephalitis except one were in areas where vaccine of batch A-40 had been used.

The cases occurred at a time when there was no evidence of any outbreaks of encephalitis due to other causes. The author sums up the findings of other workers who have observed reactions after the use of the neurotropic French vaccine; the Costa Rica and Honduras cases were very similar to those previously described.

The sera of 6 patients were examined for antibodies to other viruses (Eastern and Western equine encephalomyelitis, St. Louis encephalitis, lymphocytic choriomeningitis and parotitis), but the results were negative. Sera from patients suspected of encephalitis mostly contained yellow fever antibodies. But in persons vaccinated with A-40 the incidence of antibodies 2 months after vaccination was only 68 per cent. (of a total of 45 examined) and there was a history of actual yellow fever in persons vaccinated with this strain. These facts, and the fact that A-40 was particularly associated with the encephalitis, would suggest the possibility that, as in the classical experiments of Theiler and Whitman [this *Bulletin*, 1935, v. 32, 880], the extraneural inoculation of very minute amounts of virus is more likely to cause encephalitis than the inoculation of larger amounts. The titre of virus in certain ampoules examined as specimens of the batches used

showed the following results, in which it is to be noted that one ampoule of A-40 had very low titre:

Strain	Titre per Ampoule		LD50 per ampoule		Last date for use 1951	Sent to USA 1951
No.	1	2	1	2		
A-40	$10^{-1.5}$	$10^{-4.4}$	210	1,666,000	30 Sept.	13 Nov.
A-45	$10^{-1.0}$	$10^{-3.36}$	66	150,000	21 Oct.	13 Nov.
A-47	$10^{-3.24}$	$10^{-3.86}$	115,000	479,000	31 Oct.	13 Nov.
A-50	$10^{-4.5}$	$10^{-4.74}$	2,090,000	3,640,000	30 Nov.	13 Nov.
A-52	$10^{-4.5}$	$10^{-5.0}$	2,090,000	6,610,000	7 Dec.	28 Nov.

Virus isolated from each batch was identified as yellow fever virus.

In his discussion of this outbreak the author makes certain points of interest. In Honduras the vaccine used was of high titre and the reactions were therefore associated with the inoculation of relatively large amounts of virus. In Costa Rica all the cases of encephalitis except one were associated with strain A-40. In this area 6 cases of yellow fever occurred, and in another area not far distant, where A-40 and A-26 were used (mostly the former) there were 43 cases. A-26 was used 4–6 weeks after the date of expiry, but A-40 was used considerably before the date of expiry. The comparative failure of A-40, therefore, was probably due either to inadequate administration or to the use of ampoules of low titre. *H. Harold Scott*

RABIES

Potenza, L. & Marante, M. C. Rabia furiosa con período de incubación de ocho meses, en un niño. [**A Case of Rabies in a Child With an Incubation Period of 8 Months**] *Archivos Venezolanos de Puericult. y Pediat.* 1953, Apr.–June, v. 16, No. 48, 221–7, 4 figs. on 4 pls. [13 refs.]

The English summary appended to the paper is as follows:—

"A case of rabies in a 3 years 5 months old male child is described. The patient had not received antirabies vaccination. The incubation period was 8 months. The diagnosis was made by histological examination of the nervous system and by intracerebral inoculation in the mouse."

Polson, A. & Wessels, P. **Particle Size of Soluble Antigen of Rabies Virus.** *Proc. Soc. Exper. Biol. & Med.* 1953, Nov., v. 84, No. 2, 317–20, 2 figs.

"1. A particle size of 12 mμ has been determined by a method of diffusion coupled with biological assay for the soluble antigen of rabies extracted from infected suckling mouse brains. This value agrees with that calculated from the approximate sedimentation constant calculated from the sedimentation rate in the swinging bucket rotor of the Spinco ultracentrifuge. 2. No conclusions regarding the homogeneity of the soluble antigen can be drawn at this stage."

AMOEBIASIS AND INTESTINAL PROTOZOAL INFECTIONS

NAKAMURA, M. **Nutrition and Physiology of** *Endamoeba histolytica*. *Bact. Reviews*. 1953, Sept., v. 17, No. 3, 189–212. [109 refs.]

In this paper the author gives an extensive critical review of the present state of knowledge regarding the nutrition and physiology of *Entamoeba histolytica*, based on the available literature, of which 109 references are given. This useful review does not lend itself to a summary, but its scope can be judged from the following subjects dealt with: (1) nutritional requirements (culture media, growth factors); (2) growth in cultures; (3) physicochemical factors (*p*H, oxidation-reduction potential, anaerobiosis, temperature, etc.); (4) effect of associated bacteria, including approach to bacteria-free growth. The author notes in conclusion that very little definite information is available regarding the physiology of the amoebae apart from that of the accompanying bacteria, and that further progress will depend on successful cultivation of *E. histolytica* in pure culture. *C. A. Hoare*

SAITO, M. **Experimental Studies on the Essential Effect of Bacterial Flora upon the Cultivation of** *Entamoeba histolytica*. *Kitasato Arch. Exper. Med.* 1953, May, v. 25, Nos. 3/4, 263–73. [33 refs.]

The experiments described in this paper were carried out with the view to elucidate the bacterial factors promoting the growth of *Entamoeba histolytica* in culture. For this purpose stools containing numerous cysts were strained through gauze, centrifuged and concentrated by zinc sulphate flotation, then the cysts were freed of bacteria by treatment with 1 : 5,000 solution of mercuric chloride for 15–20 minutes, after which they were washed to remove the disinfectant.

In one experiment bacteria-free cysts were inoculated in media containing S or R forms of *Bacterium coli* or paracolon bacteria. No difference was observed between the effects of either of these variants upon the encystation and growth of the amoebae. In another experiment attempts were made to change the associated bacterial flora by addition of heavy cultures of some other species, in order to determine the effect of such a change on the growth of the amoebae. For this purpose the amoebae were either placed in a suspension with the test bacteria for 24 hours and then subinoculated into culture media or the latter were seeded with the bacteria in question 24 hours before inoculation of the amoebae. When the second method was employed, some species of bacteria (*e.g.*, *Bact. aerogenes* or *Pseudomonas pyocyanea*) became predominant, but when the media were not previously seeded the bacterial flora reverted to its original composition. In the course of this experiment the growth of amoebae was not affected in any way.

Attempts were also made to grow the amoebae with a single species of bacteria, by inhibiting with furacin [= nitrofurazone] and homosulphamin [= maphenidum] the growth of all the concomitant species except *Bact. aerogenes*, which proved to be the most resistant to these antibiotics. However, after a period of growth in subcultures, when apparently only this organism was present, the original flora was restored after the 8th subculture, from which the antibiotics were withheld. But when bacterial development in cultures was completely inhibited by these antibiotics, the amoebae failed to grow. Likewise, there was no growth in media containing only the products of bacterial metabolism, after the bacteria themselves had

been eliminated by the antibiotics. It is concluded that living " bacteria seem to produce not only the substances but also some physico-chemical conditions which are necessary for the amoebic growth ". *C. A. Hoare*

Elsdon-Dew, R. **The Pathogenicity of** *Entamoeba histolytica*. *South African Med. J.* 1953, June 13, v. 27, No. 24, 504–6.

In this paper, which was read at the South African Medical Congress in 1952, the author considers critically the question of the pathogenicity of *Entamoeba histolytica*. He notes that this parasite is blamed for a variety of disorders without justification. In some cases this is due to erroneous identification of the micro-organism found in the patient; in others the very presence of this amoeba is regarded as sufficient evidence of its aetiological rôle in the condition observed; while in other cases again symptoms conventionally associated with amoebiasis are attributed to *E. histolytica* even without any parasitological confirmation. The author points out that only in a small percentage of infections is there any evidence that the complaints attributed to amoebiasis are actually due to *E. histolytica*; in fact, amoebic dysentery and liver abscess provide the only indisputable examples of clinical amoebiasis.

The author then goes on to discuss the manifestations and epidemiology of amoebiasis observed among the European, Indian and African inhabitants of Durban [see this *Bulletin*, 1950, v. 47, 538; 1953, v. 50, 112], in the light of prevalent views on pathogenesis, and suggests that the diet may be responsible for differences in the course of amoebic infection in these 3 races. It is thought that the severity of the disease in the urban Africans is due to a protein-deficient diet of purified carbohydrates, which favours the invasiveness of *E. histolytica*, whereas in the rural African, whose food consists of crude starches, the amoebic infection runs a symptomless or mild course. It is admitted, however, that the whole question of the pathogenicity of *E. histolytica* stands in need of further investigation.

C. A. Hoare

Afendulis, T. Über die Verlaufsformen der Amöbiasis in Griechenland mit besonderer Berücksichtigung der chronischen Amöbengastritis. [**Various Forms of Amoebiasis in Greece and Observations in Chronic Amoebic Gastritis**] *Deut. med. Woch.* 1953, Dec. 25, v. 78, No. 52, 1794–6. [15 refs.]

During 1952 the author discovered in a series of 50 patients with amoebic colitis 6 who complained of gastric symptoms. By means of the " gastric mucosal relief method " (skiagram) 3 were found to represent hypertrophic gastritis, 1 showed mucosal atrophy, while in the remaining 2 the gastric mucosa was normal.

Gastric analysis showed hypochlorhydria. It is claimed that this so-called amoebic gastritis is a cause of hypochlorhydria, amoebic colitis and anaemia. It is a vicious circle.

The author discusses the subject and its literature at some length, with particular reference to Greece.

[Whether this is a reference to a primary amoebic gastritis or to a sequela of genuine amoebic dysentery is by no means clear.]

Philip Manson-Bahr

Corcos, A. Abcès du foie en Tunisie. [**Liver Abscess in Tunisia**] *Bull. Soc. Path. Exot.* 1953, v. 46, No. 5, 723–8.

Only 6 authentic cases of abscess of the liver have been seen by the author over a period of 12 years. All contained " chocolate " pus, and so were deemed amoebic in origin; but amoebae were recognized in none of them. The author suspects that pyogenic liver abscesses may be more common than is admitted. *A. R. D. Adams*

Wilkinson, J. **The Toxicity of Chloroquine in Hepatic Amoebiasis in Africans.** *East African Med. J.* 1953, Oct., v. 30, No. 10, 403–15. [17 refs.]

One hundred and twelve Bantu Africans, of the Kikuyu tribe in Kenya, suffering from hepatic amoebiasis were treated orally with chloroquine and di-iodo-hydroxyquinoline concurrently. The chloroquine was given as the sulphate, in doses of 200 mgm. of the salt (150 mgm. base) thrice daily for 14 days to all but 20 of the patients for whom the daily dose was doubled, though it was then continued for only 7 days. Three tablets (630 mgm.) of the di-iodo-hydroxyquinoline were also given thrice daily for 14 days to all the patients. The patients ranged in age from 5 years to 54 years and the age and sex distribution are displayed in a table [there is no statement of how dosages were adjusted to age or to weight].

Of the 112 patients treated 52 (46·4 per cent.) showed toxic reactions to the chloroquine. These, broadly, were headache, giddiness, anorexia, nausea, vomiting, blurring of vision, pruritus, muscular tremors and a rash; the frequency of the incidence of each of these is shown in a table. Their onset varied from the first to the tenth day of a 14-day treatment, the mean day of onset was the fourth, as is shown in another table. The degrees of severity (mild, moderate or severe) of the toxic effects are tabulated: 27 (24·1 per cent.) were mild, taking the form of headache, giddiness and nausea; 15 (13·4 per cent.) were moderate; the foregoing were more marked and there were vomiting and a rash or pruritus; 10 (8·9 per cent.) were severe, with prostration, depression, severe vomiting and muscular tremors. Classification of the toxic effects shows them to fall into 5 categories: *general*, such as loss of weight, listlessness and nervous and emotional upset; *gastro-intestinal*, such as anorexia, nausea and vomiting, liver fullness, abdominal cramps and diarrhoea; *circulatory*, such as a fall in the systolic pressure, flushing of the face, and electrocardiograph changes; *nervous*, which include headache, giddiness, insomnia, blurring of vision, and muscular tremors; and *integumentary*, with pruritus, a lichenoid or a maculopapular rash, and bleaching of hair. There are details of the incidence and the nature of each of these troubles, and there is an account of 2 patients who suffered from muscular tremors—a manifestation previously observed in dogs and monkeys, but not so far in man. The degree of severity of the toxic symptoms was directly related to the dosage, but an increase in the dosage did not proportionally increase their incidence; there was no clear relationship between age and the liability to toxic effects, but females were more prone to severe symptoms than were males. There was evidence of the development of some tolerance to the drug after 3 to 6 days and the toxic manifestations tended to diminish in severity after this became evident. The toxic effects disappear, without any permanent after effect, within 48 hours of stopping the drug. In 11 cases the drug had to be discontinued usually on account of severe vomiting, but in single cases on account of emotionalism, giddiness or muscular tremors.

The toxic effects of chloroquine appear to be due to 2 actions of the drug: its local action which affects the alimentary system and the skin; and a central action, the location of which is not clear. The incidence of toxicity was much greater among the 112 Kikuyu than that observed by Conan [this *Bulletin*, 1948, v. 45, 430] among the Europeans he studied; but the Kikuyu are of smaller stature and weight than Europeans, and they suffer from maldevelopment and chronic malnutrition. There is no reason to believe that the di-iodo-oxyquinoline played a part in the production of toxicity in these cases. As chloroquine may cause giddiness and blurring of vision it should be used with caution in the treatment of drivers or pilots; the risk of its causing vomiting must be borne in mind in cases of pregnancy, or of salt or water depletion.

[In view of the increasingly wide employment of chloroquine this paper is of considerable interest. The dosages here advocated for the treatment of hepatic amoebiasis (from 450 to 900 mgm. *of the base* daily, to a total of 6·3 gm.) seem to the abstracter unnecessarily high for routine use in gaining their immediate purpose, and they are greater than is necessary for the treatment of an acute malaria.] *A. R. D. Adams*

Collomb, H. & Sankalé, M. La thérapeutique de l'amibiase intestinale par le *bis*-(*p*.arsonophénylamino)-1,2 éthane, sel sodique. (A propos de 100 cas.) [**Treatment of 100 Cases of Intestinal Amoebiasis with the Sodium Salt of *bis*-(p.arsonophenylamino)-1,2 ethane**] *Bull. Soc. Path. Exot.* 1953, v. 46, No. 5, 749–64. [11 refs.]

This and similar compounds have been studied by a number of French workers [this *Bulletin*, 1952, v. 49, 621; 1953, v. 50, 118, 415 and 1045]. The present report is based on observations made at Saigon in the treatment of 100 patients suffering from amoebiasis; the drug mentioned was given either alone or with terramycin [oxytetracycline] to 100 patients: 32 had amoebiasis of short duration and 68 of long duration. The cases of short duration responded well to the arsenical when given alone; those of long duration needed terramycin as well. *A. R. D. Adams*

YAWS AND OTHER TREPONEMATOSES

Roberts, P. W. Informe clínico sobre el empleo de la penicilina en el tratamiento de 100 casos de mal de pinto. [**A Clinical Report of the Use of Penicillin in the Treatment of 100 Cases of Pinta**] *Bol. Oficina Sanitaria Panamericana.* 1953, Nov., v. 35, No. 5, 542–55. English summary.

The author divides pinta into 3 stages and a 4th "indefinite" stage with a variety of symptoms which precludes their admission into either of the other three. The first stage is that of the primary itching papule becoming a small erythematous patch; the second appears 5–12 months later as a discrete circumscribed area of pigmentation, "pintides", and purple hyperchromic patches in the oral mucosa and swelling of the lymphatic glands with positive serological reactions; the third stage is characterized by multiple generalized areas of pigmentation. The author was led to try procaine penicillin G because of its success in another spirochaetal disease—syphilis. It was used on 100 pinta patients in the

Valle de los Chillos, some 20 miles east of Quito where 65 per cent. of the population are affected with this disease. He divided the 100 into 4 groups of 25. Group I were given 6 doses of mapharsen, 2 a week, 1 mgm. per kgm. body weight, regardless of age or sex; Group II were given 5 injections of 5 cc. penicillin (600,000 units) once daily for 5 days, that is, 3 million units in all; Group III, 2 injections of 5 cc. penicillin every 3 or 4 days to a total of 3 million units; Group IV, a single dose of penicillin, 1,500,000 units. Of the 100 patients, 17 could not be followed up, but the remaining 83 were observed clinically and with laboratory tests for 4 months.

The findings are analysed in a series of tables, too detailed and intricate for assessment in detail here; they include the degree of reaction among patients showing hyperchromia only, those with hypochromia only and those with both; those with hyperkeratosis, those with oral pigmentation (there were none in stage I); also the Wassermann and Kahn reactions after the treatment. As regards the Wassermann reaction, of 4 in stage I, 2 showed a reduced reaction and 2 a persisting negative; of 7 in stage II 4 showed a reduced reaction, 1 a persisting negative, 1 serum was anticomplementary [1 is not reported]; of 66 in stage III 45 showed a reduction, 2 a persistent negative, 9 remained unchanged and 8 showed an increase; 2 were not included [the reason is not stated]. The figures of the Kahn test were: of the 4 in stage I, 1 showed a reduced reaction and 3 a persistent negative; of 7 in stage II, 3 and 3 respectively and 1 unchanged; of 66 in stage III 42 showed reduction, 1 a persistent negative, 17 remained unchanged and 6 showed an increase. Other tables give the changes in the lymphocytic count and in the eosinophile count [but no actual figures are given, only percentages and everywhere 1 out of 1 is called 100 per cent.].

In his summary the author states: "The clinical response to a single injection of 1,500,000 units of penicillin appears to be somewhat less than that obtained with the other three therapeutic schedules outlined above, and is not recommended as adequate treatment of pinta. Penicillin is easy to administer, and is essentially non-toxic. Therefore, the author considers it to be the treatment of choice in therapy of pinta."

H. Harold Scott

LEPROSY

Laviron & Lauret. La lèpre chez l'enfant en Afrique Occidentale Française. [**Leprosy among Children in French West Africa**] *Internat. J. Leprosy.* New Orleans. 1953, July–Sept., v. 21, No. 3, 295–306.

Leprosy is a serious problem in French West Africa, especially among the children, among whom it is estimated that there are 30,000 cases. In one area with an epidemiological index of 3 per cent., 6·8 per cent. of the children in families with leprosy were infected, against only 1·1 per cent. of those in families in which the disease was absent. In another area, with an index of 15 per cent., 15·8 per cent. of the children of the families with leprosy were affected while 14 per cent. of those in families without leprosy had the disease, indicating that where the endemicity was high the danger of infection outside the family was also high.

The first 15 years of life is the period of highest contagion, and especially the period 5 to 15 years. Only 10 to 15 per cent. of cases are lepromatous, 85 per cent. being tuberculoid or indeterminate. The authors consider that, as thousands of patients when interrogated most frequently declare

that they have never come in contact with lepromatous patients but only with tuberculoid ones, it should perhaps not be considered *a priori* that the latter are not infective. [Consideration does not appear to have been given to the fact that lepromatous cases are much more difficult to recognize on inspection during the first few years of infectivity than tuberculoid ones.] The hope is expressed that BCG vaccination at birth, followed by later revaccination, may give partial protection, but it will take some years before the effects of this measure can be estimated with accuracy.
Ernest Muir

Innes, J. R. **The Leprotic Child in Africa.** *Leprosy Review.* 1953, Oct., v. 24, No. 4, 224–31, 1 graph. [22 refs.]

The author found in his extensive surveys through East Africa a child case rate of 21 per cent. Between 5 and 14 years of age there is a great and sudden increase of cases which is considered to be due chiefly to environment and living conditions. These figures are taken to be an indication that leprosy is a living and growing entity, although many of the cases are of an evanescent nature. It was noticed that indeterminate and polyneuritic cases were infrequent. It is considered that in the attempt to control leprosy in East Africa special emphasis should be laid on the disease in children.
Ernest Muir

Cochrane, R. G. **Leprosy in Anglo-Egyptian Sudan, East and Central Africa.** *Leprosy Review.* 1953, Oct., v. 24, No. 4, 177–223, 8 figs. on 2 pls. & 1 diagram.

This is an account of a 3 months' tour through East Africa on behalf of the British Empire Leprosy Relief Association, when the following countries were visited: the Anglo-Egyptian Sudan, Kenya, Uganda, Zanzibar, Tanganyika, Nyasaland, Northern Rhodesia and Southern Rhodesia. The narrative relates the itinerary, conversations with various doctors and Government officials, and the leprosy problem as found in the different countries. Considerable progress has been made in the East African Territories since the appointment of Dr. Ross Innes 5 years ago, and under his direction a Research Unit is being developed at Itesio in the west of Kenya as a joint scheme by the East African High Commission and BELRA. A leprologist for Uganda has recently been appointed, and a similar appointment is being made for Northern Rhodesia. But in most of the places visited there was much need of a specialist who could make a prolonged stay at each of the stations and organize the work on modern lines.

As travelling facilities and industrialization increase in Africa there is danger that leprosy will spread unless prompt and adequate steps are taken to prevent it.
Ernest Muir

Sanchez, J. **Staining of *Mycobacterium leprae* by the Rio Hortega Silver Method in Frozen and Paraffin Sections.** *Internat. J. Leprosy.* New Orleans. 1953, July–Sept., v. 21, No. 3, 331–4, 3 figs. on pl.

This method of silver staining, it is claimed by the author, shows far more bacilli than the ordinary Ziehl Neelsen method, and several cases which were negative with the routine staining methods have been found positive with the double impregnation method. The tendency to absorb silver (argentaffinia) is not changed by the action of therapeutic drugs or alcohol, acetone or xylol. As the bacilli and melanin are stained the same,

the method is not applicable in the tuberculoid or indeterminate types, or in ulcers where there is contamination with other organisms.

The technique of preparing and using the stain is fully described.

Ernest Muir

Mitsuda, K. **On the Value of a Skin Reaction to a Suspension of Leprous Nodules.** *Internat. J. Leprosy.* New Orleans. 1953, July–Sept., v. 21, No. 3, 347–58. [Reprinted from *Hifuka Hinyôka Zasshi.* 1919, v. 19, 697–708.]

This is a partial reprint of a translation from the Japanese of Mitsuda's original article published in 1919. Three fractional preparations were made from leproma; one containing the upper part of a suspension of ground-up nodule, heated and carbolized; a second consisting of boiled nodule ground up and suspended 1 in 10 in saline and carbolized; the third preparation was from the remains of preparation two. Carbolized saline was used as a control. It is difficult to follow the results obtained when these preparations were injected, as the classification of cases (tuberosa, nervosa and maculosa) differs from the accepted classification now used. However, it is shown that with the first preparation only 15 per cent. were negative of the " tuberosa " cases, while with the second 65·6 per cent. were negative and with the third 97·2 per cent. were negative. With the " nervosa " and " maculosa " the corresponding results were 8·1, 20·2 and 71·8 per cent. negative respectively. These figures refer to the immediate reactions obtained. With the late reactions 94·6 to 99·6 per cent. of the " tuberosa " cases were negative, while of the " nervosa " and " maculosa " the negative late results were 34·7, 27·4 and 87·1 for the 3 preparations.

It was found that non-leprous cases gave positive reactions and the test was therefore considered to have little value for diagnosis. [The article is full of many points of interest, and it is a pity that it was not published in a European language at the time when it first appeared.] *Ernest Muir*

Schujman, S. **The Value of Lepromin Reaction in the Diagnosis of the Clinical Forms of Leprosy.** *Internat. J. Leprosy.* New Orleans. 1953, July–Sept., v. 21, No. 3, 313–22, 4 figs. on pl.

The lepromin test, and particularly the late manifestations of reaction to the test, is of particular value in indeterminate cases, in which it should be repeated at intervals of 3 months so as to trace the curve of resistance, and determine to what extent a prognosis in such cases can be made. The test is also of particular value when there are no skin manifestations and the disease is confined to the nerves. Where this occurs and bacteriological and histological examinations are not available, it is only through the lepromin test that we can determine towards which of the polar types the case is moving. *Ernest Muir*

Viette, M. Réactions d'hémagglutination et d'hémolyse conditionnée dans la lèpre. [**Haemagglutination and Conditioned Haemolytic Reactions in Leprosy**] *Ann. Inst. Pasteur.* 1954, Jan., v. 86, No. 1, 76–83. [12 refs.]

These 2 tests were applied to blood taken from patients with different forms of leprosy. The 2 types of reaction were highest in lepromatous, less in indeterminate, and still less in tuberculoid cases. The author does not consider that these reactions are useful in the diagnosis of leprosy or in

classification of cases. But, as in some cases the reactions diminished as patients improved under sulphone treatment, he considers that they may be of use in making a prognosis. *Ernest Muir*

Narula, R. N. & Gupta, V. P. **A Study on the Behaviour of Leprosy in Serological Tests for Syphilis.** *Bull. World Health Organization.* Geneva. 1953, v. 9, No. 6, 877–80.

The study was made with the object of finding which of the serological tests for syphilis gave the fewest false positives in cases of leprosy. The two tests used were the Meinicke (MK1R) and the Venereal Disease Research Laboratory (VDRL). Blood samples of 58 patients, of which 41 had the lepromatous and 17 the neural type of leprosy, were examined. False positives in leprosy are, the authors suggest, due to a similarity in antigenic nature of the lipoids liberated from lepra bacilli and the lipoids of the heart extract. They found that there were fewer false positives with MK1R than with VDRL, and this it is suggested may be due to the use of 3·5 per cent. sodium chloride in the former test, as this solution removes the thermostable factor in leprosy patients, the factor which is responsible for positive reactions: the number of flocculations decreases as higher concentrations of sodium chloride are used. It may also be that the thermostable factor which remains when the serum is heated to 56°C. for 30 minutes may be destroyed when it is heated to 65°C. for 5 minutes, " as seems to be evident from the similarity in the results obtained by the MK1R test and by the VDRL test on ' overheated ' sera." More false positives were found in lepromatous than in neural cases.
Ernest Muir

Spira, L. **Maculo-Anaesthetic Leprosy and Fluorosis.** *Exper. Med. & Surgery.* 1952, v. 10, No. 3, 194–207, 7 figs.

" A case of maculo-anaesthetic leprosy is recorded which was accompanied by the presence of ' mottled teeth '. Since mottling of the teeth is one of the external manifestations of chronic poisoning, and also because several of its other signs and symptoms are closely similar to those of leprosy, it is suggested that the 2 conditions may be identical. Infections occurring in either of them are of a secondary nature." This paper is summarized thus, and the foundations for this revolutionary hypothesis are apparently based on the fact that rats suffering from fluorine poisoning developed a condition known as " leprosy-like disease of the rat ". [The signs described do not at all resemble those of rats suffering from the disease caused by the rat leprosy bacillus, and it is generally acknowledged that rats cannot be infected with progressive human leprosy.] The other basis of the hypothesis is a certain resemblance between the signs and symptoms of leprosy and those of F poisoning. In particular, there is peripheral sensory neuritis, and sensory disturbances with hypoaesthesia and paraesthesiae in the hands and feet, affecting chiefly the area supplied by the ulnar nerve. There are also sometimes pigmentary changes when the adrenals are involved.

The author obtained further evidence by finding in a supposed case of leprosy mottling of the teeth, and thus evidence of F poisoning, prior to the age of 9. Lastly, Hutchinson's long discredited theory that leprosy is caused by eating fish is brought forward as evidence, seeing that " fluorine is not only contained in large quantities in sea fish, its concentration in sardines, for example, being as high as 15·6 p.p.m., but F compounds are

extensively used as insecticides and fungicides for conservation of practically every article of our daily food and drink". A number of experiments are recorded to show the deviations from the normal in the above patient when various substances (adrenaline, pilocarpine, atropine) were administered. *Ernest Muir*

Malfatti, M. G. & Jonquieres, E. D. L. **Study of the Morphological Modifications of *Mycobacterium leprae* during Chemotherapy.** *Internat. J. Leprosy.* New Orleans. 1953, July–Sept., v. 21, No. 3, 323–30, 12 figs. on 2 pls.

The authors have already studied and reported on the appearances of lepra bacilli as seen by the shadow-casting technique of the electron microscope [this *Bulletin*, 1951, v. 48, 1119; 1952, v. 49, 775]. This technique is of particular use when one wishes to observe surface changes on the bodies of the bacilli. The changes taking place in lepra bacilli under treatment with sulphones were studied. The authors found that the peripheral envelope surrounding the isolated bacillary units and globi tended to disappear as the vitality and virulence of the bacilli became less. The condition of this capsule was thus an index of the devitalization of the bacilli in progressive degrees as treatment continued, and was due to interference with the normal metabolism of the bacilli. The disintegration of the bacilli permits direct contact of the germs with the medium, which facilitates the action and production of natural antibodies derived from the reticulo-endothelial system. In this way the processes of absorption are initiated. With the ordinary microscope it is almost impossible to distinguish normal granular forms from bacillary units at the beginning of disintegration. *Ernest Muir*

Worsfold, J. T. **Leprosy Control in Balovale District, Northern Rhodesia.** *Leprosy Review.* 1953, Oct., v. 24, No. 4, 231–4.

It is calculated that there is about 1 per cent. of leprosy in Northern Rhodesia. An interesting experiment for its control in the Balovale District is described. In that region the population is low and there is plenty of good cultivable land available. The people are poor and work is difficult to obtain, so they value the chance of work and the security which is afforded by living near a European. With this background a central settlement has been formed with accommodation for 350 patients. These are of 3 types: severe lepromatous cases, grossly deformed patients, and able-bodied patients with a good prognosis who form the largest section and do the work of the settlement. For all other patients, about 44 per cent. who are relatively able-bodied and require long-term treatment, arrangements are made for resettlement in villages which are exclusively for leprosy patients. These villages are very popular and the villagers are entirely self-supporting as regards food and housing. They get the same medical attention and treatment as the patients in the central leprosarium and there is no tendency for them to leave their villages as they own the houses and gardens. "This experiment which is proving so practicable is providing a unique opportunity for observing the long-term results of sulphone treatment. At present the emphasis is on accurate record keeping as we are gathering in this re-settlement area, with no charge on public funds, a large number of former leprosy patients who have elected to remain under our observation and care for the remainder of their lives." *Ernest Muir*

DE SOUZA CAMPOS, N. **BCG in the Prophylaxis of Leprosy.** A Preliminary Report. *Internat. J. Leprosy.* New Orleans. 1953, July–Sept., v. 21, No. 3, 307–12. [11 refs.]

In the first article published on this subject by FERNANDEZ in 1939 [see this *Bulletin*, 1953, v. 50, 948, 1148], three questions were asked: 1. What is the value of the positive Mitsuda reactivity induced by BCG in a healthy individual? 2. What is the incidence of leprosy among subjects vaccinated with BCG and among those not so vaccinated? 3. Are there well-substantiated cases of lepromatous leprosy developing in individuals previously vaccinated with BCG?

The first of these questions may be put in other words: Has the BCG-induced reactivity [in the text "lepromin" has apparently been printed by mistake for "BCG"] the same significance as the "spontaneous" or "natural" reactivity? The answer to this is that it is undoubtedly primary infection with tuberculosis which conditions lepromin positivity when this occurs in people who have not been in contact with leprosy, at least in most cases, though other infections may sometimes have this effect. It is therefore logical to admit that BCG vaccination, which has the capacity of rendering the organism allergic by sensitizing it to tuberculin, may possess the capacity to make positive the reaction to lepromin by the same mechanism of sensitization.

The second and third questions begin to be answered by an observation at the Department of Leprosy Prophylaxis of the State of São Paulo. From February to December 1952 BCG vaccine was administered orally to 1,658 contacts of lepromatous patients, in weekly doses of 200 mgm. for 3 weeks, a total of 600 mgm. In the same period 2,329 contacts were examined but not vaccinated. In the vaccinated group, to the time when this note was prepared, there appeared 10 cases of leprosy, an incidence of 0·6 per cent., all of them of the mild tuberculoid type. In the non-vaccinated group during the same period leprosy had developed in 179 cases (5·4 per cent.). These were classified as 47 lepromatous, 84 undifferentiated, and 48 tuberculoid. [This short paper, which was sent as a letter to the editor, and was quoted in an article by LOWE and MCNULTY, this *Bulletin*, 1954, v. 51, 278, is one of outstanding importance. Such results, if confirmed by future trials, may lead to a revolution in the prevention of leprosy.]

Ernest Muir

INTERNAT. DIGEST HEALTH LEGISLATION. 1954, v. 5, No. 1, 3–35. [90 refs.] **Leprosy. A Survey of Recent Legislation.**

This interesting account of recent legislation for the control of leprosy covers some 30 countries, and mentions the measures taken in each for detection by notification, examination of suspects and contacts, and the carrying out of surveys. It then details the various forms of isolation, release and discharge, and treatment. This is followed by sections on trades, marriage and immigration. The protection of children and welfare services are next considered. Under "miscellaneous" we find definitions of "leper" and "leprosy", and matters dealing with the movements and occupation of patients. In one appendix the persons required in each country to give notification are listed, and in another the trades and callings prohibited are given. The chief reason for the survey is the fact that recent improvements in treatment have altered the outlook on the question of control of leprosy, more emphasis being laid on early diagnosis and treatment, and compulsion being reserved chiefly for those who by refusal to isolate themselves effectively are a danger to the public and especially to

children. The customs vary widely in different countries as regards legislation, facilities for hospitalization and treatment, organization of health services, etc. It is emphasized that " it would be absurd to wish to impose a uniform programme for leprosy control on the whole world ". [This survey is worthy of careful study by all who are interested in the control of leprosy.] *Ernest Muir*

Tanimura, T. & Nishimura, S. **A Review of Recent Animal Inoculation Studies with Human and Murine Leprosy Bacilli.** *Internat. J. Leprosy.* New Orleans. 1953, July–Sept., v. 21, No. 3, 335–46, 6 figs. on pl. [17 refs.]

An account is given of experimental work on rats, guineapigs, rabbits and hamsters, and their inoculation with human and rat leprosy bacilli. The fact that these organisms can multiply only in living cells is compared with a similar condition for the multiplication of viruses and rickettsiae. The results with human leprosy bacilli were entirely negative. The murine bacilli were phagocytosed by the polymorphonuclear cells, but the " histiocytes and other cells of the same origin assimilate some part of the cell cytoplasm, growing slowly, while the metabolic products of the bacilli do not injure the cell, but make up for some part of the cell stroma to maintain the vital condition. These phenomena can be interpreted as a temporary symbiosis, but extreme multiplication of the bacilli leads to an upset of the balance of metabolism and the cells perish ".

Ernest Muir

Chaussinand, R. & Toumanoff, C. Les réactions cellulaires et la phagocytose chez les cobayes inoculés par voie intrapéritonéale avec des bacilles de Hansen vivants ou morts. [**Cellular Reactions and Phagocytosis in Guineapigs Inoculated Intraperitoneally with Living and Dead Leprosy Bacilli**] *Ann. Inst. Pasteur.* 1953, Dec., v. 85, No. 6, 713–23.

Inoculation of suspension of leproma was followed by an exudate containing first polymorphonuclears and then monocytes, the latter being either macrophages or lymphocytes. The reaction was the same in nature whether the bacilli were alive or had been killed by heat, but was sometimes more intense if the bacilli were alive. This less intensity in the case of the dead bacilli may follow some chemical change in the lepromatous tissue injected and be due to the heating of the suspension. The polymorphonuclear reaction lasts only some 24 to 48 hours, but bacilli can often be found inside macrophages as long as 3 months later. Thus the natural immunity of guineapigs to human leprosy is due to their power to phagocytose the bacteria. *Ernest Muir*

Neyra-Ramirez, J. Étude de l'action du BCG sur la formule leucocytaire et la phagocytose dans l'exsudat péritonéal de cobayes inoculés avec des bacilles de Stefansky vivants ou morts. [**Study of the Action of BCG on the Leucocyte Formula and on Phagocytosis in the Peritoneal Exudate when Guineapigs are Inoculated with Living and Dead Rat Leprosy Bacilli**] *Ann. Inst. Pasteur.* 1954, Jan., v. 86, No. 1, 84–90.

Five guineapigs were vaccinated intradermally with BCG, and after 6 weeks all had become Mantoux-positive; 3 of these and 3 unvaccinated controls of the same weight were inoculated intraperitoneally with living

rat leprosy bacilli. Likewise, the other 2 vaccinated animals and 2 unvaccinated controls were inoculated similarly with a suspension of rat leprosy bacilli which had been autoclaved for an hour. The peritoneal exudate was aspirated and studied for a period of 100 days.

First polymorphonuclears phagocytosed the bacilli, followed by monocytes which ingested and destroyed bacilli, and also destroyed both polymorphonuclears and monocytes containing bacilli. The rate at which this "*autophagie*" took place varied in the different groups. In the vaccinated animals it took 4 to 8 days with the living bacilli, and 4 to 6 days with the dead ones. In the unvaccinated controls it took 12 to 16 days with the living bacilli, and 12 to 14 with the dead. There was pyknosis of the nuclei of the polymorphonuclears in the animals inoculated with living, but not dead, bacilli, which may have been due to toxins either from the living bacilli or from the rat tissue. The more rapid *autophagie* in the vaccinated animals is taken as an indication of increase in the defence mechanism in animals which are naturally resistant to rat leprosy bacilli. *Ernest Muir*

HELMINTHIASIS

Cowper, S. G. **Schistosomiasis in Mauritius.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1953, Nov., v. 47, No. 6, 564–79, 4 graphs & 4 maps. [28 refs.]

In 1934 Adams [this *Bulletin*, 1934, v. 31, 774] proved that *Bulinus* (*Pyrgophysa*) *forskali* was a vector of *Schistosoma haematobium* in Mauritius. In addition, he provided evidence which suggested that there was no other species of mollusc on the island involved in the transmission. Dr. Cowper, in the paper now being abstracted, has confirmed Adams's work in Mauritius, both as regards the infectability of *B. forskali* and the failure to incriminate other species. During the 20 years which have elapsed since Adams's work in Mauritius, *B. forskali* has been repeatedly suspected of being a transmitter in various parts of Africa, including Portuguese Guinea, Uganda, Kenya, Saudi Arabia, Egypt and Nyasaland. In no instance, however, has the suspicion been confirmed; for naturally infected snails have not been recorded from any of these areas and all attempts to infect *B. forskali* snails obtained from areas other than Mauritius have failed. [Dr. Cowper's paper was written before Dr. Le Roux's announcement at a laboratory meeting that he had successfully infected *B. forskali* bred from parents introduced into England from the Gambia. (Le Roux, *Trans. Roy. Soc. Trop. Med. and Hyg.*, 1954, v. 48, 5.)]

The following is the author's summary:—

"(1) In the course of a survey of schistosomiasis (*S. haematobium* only) in Mauritius, this infection was found to be widespread throughout large areas of the island.

"(2) The most heavily infected regions are the Port Louis-Pamplemousses area, an area round Argy and an area in the south centering round Carreau Accacias (Grand Port). The part of the island lying north of the Port Louis-Argy-Flacq line is more heavily infected than the rest, but there is also a good deal of infection in the built-up areas of Plaines Wilhems with a possible source of infection in Rose Hill.

"(3) The city of Port Louis is dealt with in some detail. The infection rate in the northern half of the city is significantly higher than in the southern half. It is believed that the River Latanier and various streams

and irrigation channels in the Ste. Croix (Père Laval) area are a principal source of infection.

" (4) In a survey of 50 schools extending throughout the island an infection rate above 50 per cent. was found in two schools, above 25 per cent. in eight and above 10 per cent. in 15 schools. Full details are presented in a table.

" (5) No significant seasonal incidence in cases recorded in the laboratory routine was noted, but there is some evidence that transmission corresponds with the hot wet season (December to April). The sex incidence showed that about twice as many males as females are infected (all ages). Age-groups indicated that the disease is uncommon in infants below 5 years and in the middle-aged, while incidence is highest in school children, adolescents and young adults. There is no indication of any racial immunity or susceptibility, the predominance of infection among Indians and Creoles being certainly occupational.

" (6) In a series of experiments the local strain of *S. haematobium* was passed through *Bulinus* (*Pyrgophysa*) *forskali* Erhenberg, cercariae were shed, mice infected, and adult worms and ova recovered. This confirms the previous experimental work of Adams (1934–35). A description of this snail is given. All experiments with other molluscs were negative.

" (7) The epidemiological evidence in favour of *B. forskali* as the only natural vector is considered and found to be conflicting. While a second vector cannot be absolutely ruled out, *B. forskali* should certainly be considered the presumptive vector. No natural wild infection has yet been discovered. Part of the literature dealing with *B. forskali* as a suspect is summarized. This species has not been definitely incriminated outside Mauritius so far as the writer can ascertain.

" (8) An attempt to use the cercarial antigen skin test for screening and diagnosis is described. Reasons are given for rejecting this test as locally unreliable." *R. M. Gordon*

Dreyfuss, R. Les planorbes de la Martinique. [**Planorbids of Martinique**] *Arch. Inst. Pasteur de la Martinique.* 1953, July–Oct., v. 6, Nos. 3/4, 43–6.

In Martinique there are 4 species of *Planorbis*, *P. schrammi*, *P. lucidus*, *P. cultratus* and *P. guadeloupensis* [= *Australorbis glabratus*]. Of these, only the last named species is known to transmit *Schistosoma mansoni*. The first 3 species are small, less than 10 mm. in diameter; *A. glabratus* is 20 to 28 mm. on an average and may attain 30 mm. in diameter. A brief account is given of its habitats and distribution in Martinique and also of its feeding habits, reproductive activity and vitality. Possible methods of control are discussed and are stated to be limited and uncertain.

J. J. C. Buckley

Maldonado, J. F. & Acosta-Matienzo, Josefina. **A Comparison of Fecal Examination Procedures in the Diagnosis of Schistosomiasis mansoni.** *Exper. Parasit.* New York. 1953, July, v. 2, No. 3, 294–10. [22 refs.]

Maldonado and Acosta-Matienzo report in detail on their investigation of the efficiency of the various methods recommended for the examination of human stools for *Schistosoma mansoni* infection. The methods employed were: direct saline smear, HCl-ether centrifugation, Na_2SO_4-Triton-ether centrifugation, SAEX (saline-" Laboratory Aerosol " [a detergent]-ether-xylol) centrifugation, and sedimentation by gravity in glycerinated water.

A few trials were undertaken with the following modifications: half-strength Na_2SO_4-Triton-ether; formol-Na_2SO_4-Triton-ether; HCl-Na_2SO_4-Triton-ether, and SAEX applied to 1 ml. of stool. The percentage of correct diagnoses by these methods was 84, 96, 98, 92, 100, 100 (6 specimens only), 100 (18 specimens only), 100 (27 specimens only) and 98 respectively.

For diagnostic purposes none of the methods and modifications was proved significantly superior.

It is concluded that the examination of 3 thick, 22 mm. square preparations from a well-stirred faecal specimen proved highly satisfactory for quick diagnosis. *P. L. LeRoux*

Schwetz, J. Sur un cas d'infection accidentelle d'une souris blanche par trois schistosomoses. [**Accidental Infection of A White Mouse by Three Schistosomes**] *C.R. Soc. Biol.* 1953, Oct., v. 147, Nos. 19/20, 1646–8, 4 figs.

The author's summary in French is translated freely as follows:—

Of three mice bathed in water containing cercariae from 5 *Physopsis* from Kabwe river (Mokambo, Katanga), one died a short time afterwards. The other two remained negative (that is to say, without passing schistosome eggs in the faeces) for several months. But in the liver of the second mouse, which died 119 days after exposure to cercariae, several male *S. haematobium* were found. The following day, the third mouse was sacrificed and in its liver were found: (1) males of *S. haematobium* and a female of *S. rodhaini*; and (2) eggs of *S. haematobium*, *S. rodhaini* and *S. mansoni*. This triple infection could be accounted for by the fact that for the examination of *Physopsis*, and for the exposure of the mice, the water used came from the Lubembe (Sakania) river in which planorbid snails, naturally infected with cercariae of both *S. mansoni* and *S. rodhaini*, were found. *J. J. C. Buckley*

Mozley, Alan. **A Background for the Prevention of Bilharzia.**
This book was reviewed on p. 128.

Wright, W. H. & Dobrovolny, C. G. **Experiments in the Control of Schistosomiasis in Brazil.** *Pub. Health Rep.* Wash. 1953, Dec., v. 68, No. 12, 1156–60, 3 figs. & 1 map.

This paper records briefly the results of field trials carried out in Brazil against the local snail vectors of *S. mansoni*, namely *Australorbis glabratus* and species of *Tropicorbis*. In the early experiments the chemicals were sprayed on to still pools or ditches in a proportion of 10 parts per million. Later the effects of other methods of application and other concentrations of the molluscicides were investigated. The results were assessed by weekly snail surveys over a period of 6 weeks.

Of the 33 chemicals studied only 7 proved to be 99 to 100 per cent. effective in reducing the snail population. When they were tested in running streams sodium pentachlorophenate proved to be the most effective and it had the advantage of not being very toxic to man. The compound was usually applied at the head of the stream and sometimes at selected intervals downstream, the quantity used being calculated from the rate of flow. In most streams little of the chemical could be detected as distances of more than 4,000 feet below the point of application. The kill of snails

was greatest in the first 1,000 feet below the dosing point and concentrations of 10 to 20 parts per million were most efficient. The effectiveness of molluscicides is a function of time as well as of concentration; dosages as low as 2 parts per million for 40 hours were about as effective as higher concentrations for 8 hours.

In 11 of 28 streams no snails were found during the month following treatment and in parts of some streams for as long as 12 months. Most of the streams were, however, repopulated by the fourth month after treatment. The sudden appearance of large snails indicated that they had been out of the water when it was treated. Effective snail control can be achieved by repeated treatment at intervals of 3 to 4 months, but since some snails escape poisoning eradication cannot be attained in a year. In a comparison of these results with those of other places it is suggested that application methods must be varied from area to area, depending on the ecological conditions of the snails. *T. H. Davey*

Fain, A., Thienpont, D., Herin, V. & Deramée, O. Observations sur *Schistosoma rodhaini* Brumpt au Ruanda-Urundi, et description de la cercaire de ce schistosome. [**Observations on** *Schistosoma rodhaini* **in Ruanda-Urundi and Description of the Cercaria**] *Ann. Soc. Belge de Méd. Trop.* 1953, Oct. 31, v. 33, No. 5, 423–43, 1 fig. [14 refs.]

Thienpont, D., Herin, V., Fain, A. & Deramée, O. Étude clinique et histo-pathologique de la bilharziose canine à *Schistosoma rodhaini* au Ruanda-Urundi. [**Clinical and Histopathological Study of** *Schistosoma rodhaini* **Infection in Dogs in Ruanda-Urundi**] *Ann. Soc. Belge de Méd. Trop.* 1953, Oct. 31, v. 33, No. 5, 487–94, 4 figs. on 3 pls.

Leigh, W. H. *Cercaria huttoni*, **sp. nov., a Dermatitis-Producing Schistosome Larva from the Marine Snail,** *Haminoea antillarum guadalupensis*, **Sowerby.** *J. Parasitology.* 1953, Dec., v. 39, No. 6, 625–9, 6 figs. on pl. [14 refs.]

Hutton (*Bull. Mar. Sci. Gulf and Caribbean*, 1952, v. 2, 346) found 2 species of schistosome cercariae in marine snails in the Miami area of Florida, which he labelled temporarily "*Cercaria H*" and "*Cercaria J*", the latter species having been found in the marine gastropod *Haminoea antillarum guadalupensis*. No experiments were carried out with "*Cercaria H*", but when "*Cercaria J*" was allowed to penetrate the skin of volunteers it produced a dermatitis, and the present paper is concerned with the description of "*Cercaria J*" which the author regards as a new species, and for which he proposes the name *Cercaria huttoni*.

In addition to describing the morphology of this cercaria the author provides some notes regarding its habits and the reactions which followed the exposure of a subject's arm to infection with these cercariae: and, finally, he reviews the literature concerning the relationship of schistosome cercariae to sea bather's eruption.

[This paper should prove very helpful to those interested in the somewhat neglected subject of dermatitis caused by cercariae from marine molluscs.] *R. M. Gordon*

Varma, A. K. **On** *Fasciola indica* **n. sp. with some Observations on** *F. hepatica* **and** *F. gigantica*. *J. Helminthology.* 1953, v. 27, Nos. 3/4, 185–98, 7 figs. [11 refs.]

"1. *Fasciola indica* n. sp. from goats, cattle and buffaloes in Bihar is described and differentiated from *F. hepatica* and *F. gigantica*.

"2. Specimens of *Fasciola* from Assam (cattle and buffaloes), Rangoon (cattle), Singapore (pig) were examined and identified as *F. indica*.

"3. *F. hepatica* is further differentiated from *F. gigantica* on the basis of the cuticular armature and the disposition of the intestinal branches."

VANNFÄLT K. A. **On the Hepatic Function in Persons infected with Tapeworm** (*Taenia* **or** *Diphyllobothrium*). *Acta Soc. Med. Upsaliensis.* 1952, v. 57, Nos. 3/4, 127–37. [11 refs.]

Liver function was studied in 48 patients (36 women and 12 men) infected with *Diphyllobothrium* or *Taenia*. The Meulengracht icteric index in the blood serum was increased after anthelmintic cure, when 83 per cent. exhibited a pathological value. In 8 cases followed up, the index remained elevated for 6 weeks in 1 case and for 6 months in another case. In the other 6 cases the elevated index fell to normal within a week. Urobilin and urobilinogen, when present in the urine, tended to decrease after cure. The Takata and van den Bergh tests were negative in all cases. Blood bilirubin values of over 1 mgm. per 100 ml. were found in 19 per cent. before, and in 56 per cent. after, cure. Citric acid was elevated in all cases tested both before and after cure. Other examinations made were phosphatase test, thymol test, bromsulphthalein test, haemoglobin and erythrocyte levels; these were normal except in a few cases.

It would appear that in some cases the tapeworm patients exhibited signs of damage to the liver parenchyma which may be increased by the treatment given. *J. H. Birkinshaw*

PUJATTI, D. Un caso di sparganosi umana. [**A Human Case of Sparganosis**] *Riv. di Parassit.* Rome. 1953, Oct., v. 14, No. 4, 213–17, 1 fig. [30 refs.]

The English summary appended to the paper is as follows:—

"The author reports a case of Sparganosis, probably *Diphyllobothrium* (*Spirometra*) *erinacei* Rudolphi, 1819, observed in Genoa (Ospedale S. Martino) in a woman 40 years old (right forearm)."

PAUTRIZEL, R. & GOSMAN, T. Intérêt de l'étude des variations de l'éosinophilie sanguine dans le diagnostic de l'échinococcose humaine. [**The Interest of the Study of Blood Eosinophilia in the Diagnosis of Human Echinococcosis**] *Bull. Soc. Path. Exot.* 1953, v. 46, No. 5, 721–3, 1 fig.

The Casoni intradermal reaction is one of the simplest and most practical tests, but its interpretation may be difficult. Seeking a diagnostic test suitable for doubtful cases, the authors studied the percentages of eosinophiles after intradermal injection of hydatid fluid sterilized by Seitz filtration into patients with hydatid cysts. Eosinophiles were counted in a Nageotte cell in blood diluted with a reagent that stained the eosinophiles and lysed the other blood cells. Blood was taken from the finger-tip once before the injection of the antigen and at other times during the succeeding 30 minutes.

In the patients examined by the authors, injection of the antigen was always accompanied by an eosinopenia followed sometimes by eosinophilia. The eosinophiles reached their lowest level in 30 to 180 minutes and their number fell by 50 per cent. or more. Injection of the same antigen into

uninfected controls produced either a slight eosinophilia or a very light eosinopenia.

The authors say that this decrease of eosinophiles seems to them to be the most reliable indication of hydatid infection. It is comparable with the reaction reported by Pautrisel, R., Rivasseau, J. and Rivasseau, D. [no ref.] in sheep infected with liver fluke.

The eosinophilia that often appears 24 to 48 hours after a positive Casoni reaction does not in any way depend on the same mechanism. In 1923 Manassei [no ref.], advised, as an addition to the Casoni reaction, the study of the eosinophilia produced by injection of hydatid fluid, and he noticed a rise of 1·5 to 6 per cent. in the eosinophiles. Bocchetti and Begani [this *Bulletin*, 1953, v. 50, 323], have also emphasized the interest of this reaction.

This late eosinophilic reaction is neither constant, nor is it greater than a rise of 1·5 to 6 per cent., but the eosinopenia is very clear and shows a decrease to half the number of the eosinophiles. The authors conclude that a patient showing a decrease of 50 per cent. of his eosinophiles after injection of hydatid fluid is showing a positive reaction, even if the local reaction is not clear. Conversely, a doubtful intradermal reaction should be considered negative if it is not accompanied by eosinopenia.

G. Lapage

Weinstein, P. P. **The Cultivation of the Free-Living Stages of Hookworms in the Absence of Living Bacteria.** *Amer. J. Hyg.* 1953, Nov., v. 58, No. 3, 352–76, 9 figs. on pl. [32 refs.]

Eggs of *Ancylostoma caninum* and *A. duodenale* were cultured successfully to the infective larval stage in fresh chick-embryo or rat-liver extracts which were made free from viable bacteria; larvae of *A. caninum* obtained thus from rat-liver-extract culture developed normally in a puppy. The optimum concentration of the extracts was 50 per cent. of chick embryo or 20 per cent. of rat liver and the larval development was greatly improved by transfer of cultures. Inhibitory effects resulted from the heating of the tissue extract and after its passage through a bacteriological filter the larvae would not develop in it. Gross fractionation of the extract into high and low molecular weight components by dialysis or high-speed centrifugation also affected larval development. The accumulation of liquid globules and ultimate death resulted when larvae were cultured in extract dialysed against either 0·85 per cent. sodium chloride or Tyrode solution. Development was poor in the supernatant formed by high-speed centrifugation of rat-liver extract and abnormal larvae resulted when cultures were made from sediment representing components of high molecular weight.

J. J. C. Buckley

Piazza, V. C. Sulla patogenesi della anchilostomanemia. [**The Pathogenesis of Hookworm Anaemia**] *Rass. Med. Indust.* Turin. 1953, Nov.–Dec., v. 22, No. 6, 329–32. [10 refs.]

The pharmacological action of liver tissue is due to a hormone which stimulates the blood-forming organs. Its use in pernicious anaemia is a replacement therapy: the condition is controlled so long as small doses continue to be taken, but signs and symptoms return if this treatment is stopped.

In the secondary types of anaemia liver extract has a dramatic effect and its administration is no longer required after the normal blood picture has been re-established and the cause of the anaemia has been removed.

Liver extract is of no help in the aplastic forms of anaemia because the blood-forming organs are so damaged that they cannot respond to the hepatic hormone.

Hookworm disease has a toxic effect on these blood-forming organs and liver extract can only cure the anaemia which is due to this helminth after the parasite has been got rid of. Indeed, this parasite should be looked for when cases of what appears to be a secondary anaemia do not improve under liver therapy alone.

This is not to deny the other contributory factors in the aetiology of hookworm anaemia. The parasite causes bleeding through its means of attachment to the intestinal wall, maintains this haemorrhage by discharging an anticoagulant body and produces other haemolytic elements.

J. Cauchi

Kurian, P. V. **Treatment of Ascariasis in Children with Hetrazan.** *J. Indian Med. Ass.* 1953, Sept., v. 22, No. 12, 488–9. [10 refs.]

The high fertility rate of the female *Ascaris lumbricoides* and low sanitary standards are responsible for the widespread infection with this worm in the Nilgiris, where "10 to 21 per cent." of all stools show *Ascaris* ova.

Heavy infections in young children on a poor scale of diet may cause gross malnutrition. It will take many years to improve environmental sanitation; in the meantime the best method of improving conditions is by mass treatment.

Of the drugs used for this, santonin is effective but may kill young children. Oil of chenopodium is also effective but is unpopular on account of its odour. Therefore there is an opening for another drug. Diethylcarbamazine is not toxic in moderate doses; it is otherwise easy to administer, and it has been used fairly extensively for this infection in recent years. A trial was undertaken with this drug; several different dosages were used and a control series with oil of chenopodium was run at the same time.

The test for cure was the taking of a specimen of faeces 14 days after the completion of treatment; a smear was examined and if no ova were found the specimen was subjected to saline concentration and re-examined. If no ova were found on 3 consecutive days cure was assumed.

Children in series I received diethylcarbamazine in doses of 1 mgm. per lb. body weight thrice daily for 5 days; only 1 of 13 patients showed absence of *Ascaris* ova.

Children of series II received 2 mgm. per lb. body weight thrice daily for 7 days; 1 of 6 patients showed absence of *Ascaris* ova.

Children of series III received a single dose of 5 mgm. per lb. on the first day, and 9 mgm. per lb. on the second and third days; 3 out of 17 patients showed absence of *Ascaris* ova.

Children of series IV received oil of chenopodium 2 minims for each year of age up to 10 minims; in 9 out of 10 children no ova were found.

In series II and III, 1 and 4 children had slight by-effects, nausea and abdominal pain.

The author concludes that diethylcarbamazine may prove a useful addition to the drugs for the treatment of ascariasis in children but that its efficacy is less than that of oil of chenopodium.

L. E. Napier

Anderson, H. H. & Hurwitz, G. K. **Dodecylamine and other Agents active against *Ascaris lumbricoides* and their Toxicity in Mammals.** Reprinted from *Arch. f. Exper. Path. u. Pharm.* 1953, v. 219, 119–29. [Numerous refs.]

Kessel, J. F., Thooris, G. C. & Bambridge, B. **The Use of Diethylcarbamazine (Hetrazan or Notezine) in Tahiti as an Aid in the Control of Filariasis.** *Amer. J. Trop. Med. & Hyg.* 1953, Nov., v. 2, No. 6, 1050–61. [13 refs.]

Following the mass administration of diethylcarbamazine (Hetrazan, Notézine) as a microfilaricide, annual microfilarial counts have been determined in Tahiti for periods of 1, 2 and 3 years [see this *Bulletin*, 1949, v. 46, 1064; 1950, v. 47, 60, 146; 1953, v. 50, 47, 738].

The authors have employed two dosage schedules: (1) 2 mgm. per kgm. of body weight three times daily for 7 days, repeated at the end of the year on those who still had microfilariae in their blood; (2) 2 mgm. per kgm. of body weight 3 times daily, one day each month for a period ranging from 12 to 18 months. The results have been recorded in terms of (a) the percentage of population which remains positive for microfilariae, (b) the average number of microfilariae per 20 cmm. of blood, and (c) the frequency distribution among the population of microfilarial counts per 20 cmm. of blood at 6 different levels.

It was found that among 145 positive on the first schedule, the percentage was reduced to 17·5 at the end of the second year and the average microfilarial count per 20 cmm. dropped from 79 to 0·8, while the frequency distribution results showed a marked reduction at all levels with no positives above the 11–30 age group. Field studies in those areas where considerable migrations of population occur, and where strict supervision could not be so effectively carried out, likewise exhibited marked reductions at the end of 2 years. The second dosage scheme of 2 mgm. per kgm. body weight 3 times daily, one day a month for one year, promises to be a practical method of administering diethylcarbamazine in a filariasis control programme.

An " infection factor " is a new term which has been introduced. This is the percentage of positive mosquitoes, multiplied by the average number of infective larvae per positive mosquito and divided by 100; an arbitrary " infection factor " may thus be established. By multiplying this by the percentage of persons positive for microfilariae at each age level in a given group an arbitrary " infection rate " per level or per group may be established. These figures can be employed for determining the frequency distribution at the same levels in man before and after the use of diethylcarbamazine.

All data observed after the administration of the drug showed marked reduction in microfilarial density. It has yet to be determined whether this reduction suffices to limit the transmission to a level where clinical cases will cease to exist.

The results of these studies are shown in great detail in the original paper.

Philip Manson-Bahr

Pfister, R. **Guide pratique pour le diagnostic et le traitement des filarioses humaines en A.O.F.** [Practical Guide for Diagnosis and Treatment of Human Filariasis in French West Africa]

This book was reviewed in this *Bulletin*, 1953, v. 50, 1114.

Mazzotti, L. Distribución de filarias machos y hembras en 113 nódulos de *Onchocerca volvulus*. [**Distribution of Male and Female Filariae in 113 *Onchocerca* Nodules**] *Rev. Inst. Salubridad y Enfermedades Trop.* Mexico. 1953, Sept., v. 13, No. 3, 203–7, 2 figs. on pl.

The English summary appended to the paper is as follows:—

" 116 nodules of *Onchocerca volvulus* were artificially digested to determine the number of worms and their sex. Adult worms of only one sex

were found in 46 (41%) of the nodules (45 nodules with 1 or 2 females and 1 nodule with 2 males). Adult worms of both sexes were found in each of the other nodules, but in low numbers; the highest counts were given by 3 nodules that showed respectively: 3 males and 3 females; 5 males and 2 males, and 1 female and 5 males."

PELLISSIER, A. Le granulome lipidique dans la structure histologique des nodules sous-cutanés à *Onchocerca volvulus*. [**Lipoidal Granuloma in the Histological Structure of Subcutaneous Nodules Caused by** *Onchocerca volvulus*] *Bull. Soc. Path. Exot.* 1953, v. 46, No. 5, 709–10, 2 figs. on pl.

The histology of nodules caused by *Onchocerca* spp. has been described by MARTINÉZ-BAÉZ [this *Bulletin*, 1935, v. 32, 649]. The present author during recent years has examined histologically nodules from 16 cases of onchocerciasis at the Institut Pasteur at Brazzaville.

While confirming in general the findings of Martinéz-Baéz, he has been able to determine the process of evolution of these lesions. Initially there is a simple inflammatory reaction around a cluster of worms; there is vascular dilatation with new capillary formation and an escape of cells and serum, followed by a histiocytic response. At this stage the adult worms are intact; the microfilariae escape through the inflammatory tissue to the subcutaneous tissue and skin.

The inflammatory reaction then becomes a foreign-body granulomatous type of reaction directed to the encirclement and destruction of the parasites; there are lymphocytic, plasmocytic, and large phagocytic cells, and giant cells with numerous nuclei and an acidophilic cytoplasm appear. Around the area a fibroblastic reaction develops and forms a fibrous capsule. The microfilariae continue to escape, but the adult worms begin to show evidence of damage.

The next stage is destruction and liquefaction of the parasites by enzymes secreted by the inflammatory cells. It is patchy in distribution throughout the nodules, and areas of liquefaction of the parasites are found adjacent to areas where the parasites are not much affected; quite often there is a polymorphonuclear cellular invasion. The fibrous reaction continues round the periphery and slowly inwards, until finally the nodule consists largely of cicatricial tissue.

The stage of irregular liquefaction is the lipoidal granuloma referred to in the title. Why the process of necrobiosis and liquefaction of the parasites should be localized and not general in those tumours in which it occurs, and why it should have been found in only 3 of 32 carefully studied cases, are questions to which no answer has been found.

The paper is illustrated by two good photomicrographs.

A. R. D. Adams

HARTZ, P. H. Histopatología del colon en la tricocefalosis masiva de los niños. [**Histopathology of the Colon in Mass** *Trichuris* **Infection in Children**] *Archivos Venezolanos de Puericult. y Pediat.* 1953, Apr.–June, v. 16, No. 48, 209–20, 9 figs. on 3 pls. [25 refs.]

The English summary appended to the paper is as follows:—

"The author reports the histological findings in the colon in cases of massive Trichuriasis in children.

"No lesions that could be attributed to the parasitic infestation were found except for mechanical compression of the cells of the colonic mucosa. It is suggested that part of the symptoms found in such infestations are caused by irritation of the nerves of the colonic mucosa. In view of the fact that trichuriasis is seldom found without associated infestations with other parasites and complicating malnutrition, these factors must be excluded before accepting the trichuriasis as the cause of symptoms like anemia.

"No proofs were found that the invasion of the colonic mucosa by trichuris was secondary to infection with micro-organisms."

Jírovec, O. Helminthiase v Československu. [**Helminthiasis in Czechoslovakia**] *Československ. Hyg., Epidemiol., Mikrobiol.* Prague. 1953, v. 2, No. 5, 385–95. German summary.

Enterobiasis is the commonest form of helminth infestation in Czechoslovakia, and in an investigation of 5,700 persons carried out in 1949–50 an incidence of 20 to 79 per cent. was found in different parts of the country. Trichuriasis is next in order of frequency, and various workers have found an incidence of 6·7 to 36·3 per cent. in recent years. Ascariasis was found in 1·3 to 5 per cent. (on one occasion, 12·7 per cent.) of persons investigated. Trichinosis is rare in Czechoslovakia, but there are apparently 2 endemic foci in the Strakonice and Jihlava areas, where 39 and 45 cases respectively have been observed between 1893 and 1952. Taeniasis, cysticercosis and echinococcosis are also rare, and only isolated cases of ankylostomiasis, strongyloidiasis and hymenolepiasis have been recorded. *D. J. Bauer*

Bumbalo, T. S., Gustina, F. J., Bona, J. & Oleksiak, Rose E. **Pinworm Infection (Enterobiasis) in Children. A Comparative Study of Four Oxyuricides.** *Amer. J. Dis. Children.* 1953, Nov., v. 86, No. 5, 592–600. [Refs. in footnotes.]

The authors give a useful summary of some of the extensive literature about this subject. They think that, although the symptoms caused by *Enterobius vermicularis* are usually mild and occasionally absent, about 25 per cent. of infected children require diagnosis and treatment. Bijlmer [this *Bulletin*, 1947, v. 44, 111] reported death due to invasion of the intestinal wall by these worms. The authors consider that in about 5 to 10 per cent. of all cases of appendicitis in children sufficient numbers of these worms have been found in the appendix to establish a definite relationship between the infection and the appendicitis.

The authors discuss the symptoms and the diagnosis, giving a useful summary of the literature about diagnosis. They themselves used a modification of the Graham Scotch-tape technique [Graham, this *Bulletin*, 1941, v. 38, 525], which they describe. The smears are taken early in the morning when the child arises and considerable time and expense can be saved if the entire family is treated, even if only one member of it has a positive diagnostic smear.

After giving a useful review of the literature about treatment, and a table showing the results of treatment with 9 drugs, the authors describe their experimental work on the treatment of 160 cases of threadworm infection with Egressin (thymol-n-isoamylcarbamate), Diphenan (parabenzylphenylcarbamate), gentian violet (methylrosaniline) and terramycin (oxytetracycline). All these drugs were given by the mouth and 42 per cent. of the

patients were in hospital, the remainder being in clinics. All patients were told to keep their fingers and playthings out of their mouths, to keep their finger nails cut short, to scrub their hands and nails before meals and after using the toilet, to bathe each morning, a shower being preferred, to put on clean personal linen and use clean bed linen daily if possible, to use separate face and body towels, to sterilize non-washable toys, to vacuum-clean the bedroom daily, to raise the room temperature as much as possible each morning and then to air the room and to apply carbolated petroleum to the perianal area. The authors believe that the use of antiseptic or anti-pruritic ointments on the perianal area helps to keep the egg concentration in the infected child's room to a minimum and may help to trap eggs at the anal orifice.

A table shows the results of the treatment with the drugs tested. The 160 patients were divided into 4 groups, each group of 40 receiving one of the drugs. Cures were obtained with Diphenan in 30 per cent. of the cases, with Egressin in 52 per cent., with gentian violet in 82 per cent. and with terramycin in 84 per cent. Thus terramycin was the most successful of the 4 drugs, but it must be used with some caution and it is expensive. The authors conclude that the ideal oxyuricide is yet to be found. [Their paper was written before the successful use of piperazine hydrate reported by White and Standen [this *Bulletin*, 1954, v. 51, 86]. *G. Lapage*

von Brand, T., Weinstein, P. P. & Wright, W. H. **The Working Ability of Rats infected with** *Trichinella spiralis*. *Amer. J. Hyg.* 1954, Jan., v. 59, No. 1, 26–31, 1 fig.

"The running ability, that is, the ability to perform muscular work, was definitely reduced in rats infected with *Trichinella spiralis* larvae, regardless of whether the infection was young and the larvae were migrating in the muscles, or old and the larvae encapsulated. In view of these findings and despite the necessary caution in drawing, from experiments on rats, conclusions on pathological conditions in human beings, it would seem that claims of reduced working ability due to chronic trichinosis cannot be denied a certain probability."

Zaiman, H., Wilson, J. D., Rubel, June & Stoney, J. M. **Studies on the Nature of Immunity to** *Trichinella spiralis* **in Parabiotic Rats. IV. The Immune Response in "Uninfected" Parabiotic Rats surgically separated from their Mates 2, 3, 4, or 5 days after the Latter received an Immunizing Infection.** *Amer. J. Hyg.* 1954, Jan., v. 59, No. 1, 39–51.

Zaiman, H. & Stoney, J. M. **Studies on the Nature of Immunity to** *Trichinella spiralis* **in Parabiotic Rats. V. The Strength of the Immune Response in the "Uninfected" Twin One Month after its Mate received an Immunizing Infection of** *Trichinella* **at the Rate of 15 Larvae Per Gram of Body Weight.** *Amer. J. Hyg.* 1954, Jan., v. 59, No. 1, 52–9.

"Two experiments have been reported which indicated that when one member of a pair of parabiotic rats was infected with *Trichinella spiralis* at the rate of 15 larvae per gram of body weight, the strength of the immune response in the 'uninfected' mate was sufficient to protect a

large majority of the latter from the lethal effects of a challenge dose (75 larvae per gram of body weight) which killed all but one pair of control animals."

SPRUE

Rodriguez-Molina, R. **Fundamental Concepts in the Diagnosis of Sprue.** *Ann. Intern. Med.* 1954, Jan., v. 40, No. 1, 33–41.

The term sprue is intended to comprise the tropical and non-tropical varieties (idiopathic steatorrhoea) and it is believed that these syndromes are manifestions or phases of one disease. The clinical course and response to therapy are believed to be fundamentally similar. In 100 selected cases (57 males and 43 females), ranging in age from 12 to 78 years, suffering from uncomplicated sprue, 97 per cent. complained of gastro-intestinal disturbances, grouped together under the term "dyspepsia"; 98 patients were inhabitants of Porto Rico and, with few exceptions, were of the indigent class. Gastro-intestinal symptoms were the earliest manifestations, and physical examination revealed a marked degree of muscular wasting or cachexia. Stomatitis and glossitis were present in 94 per cent. and pallor of the skin in 70 per cent. In 63 per cent. there were patches of brownish hyperpigmentation, always symmetrical. Occasionally the skin changes were pellagroid. Anaemia of variable intensity was encountered in all patients. The determination of basal metabolic rates showed normal values. Considerable detail is given regarding the various findings in the group of patients studied.

The diagnosis of the sprue syndrome is based upon the following:— (1) Insidious onset, chronicity and paucity of spontaneous remissions. (2) Stomatoglossitis, with or without atrophy of the lingual papillae. (3) Gastro-intestinal disturbances. (4) History of recent weight loss. (5) Presence of free hydrochloric acid in a high percentage (90 per cent.). (6) Macrocytic, hyperchromic anaemia associated with megaloblastic marrow. (7) Flat oral glucose-tolerance curve. (8) Absence of neurological manifestations. (9) Hyperpigmentation of the skin, particularly the face, arms and legs. (10) "Inflammation" and atrophy of the gastric and recto-sigmoid mucosa.

The underlying pathological condition is in the small intestine, presenting itself as a defect of intestinal absorption. This shows itself histologically by atrophy of the mucosa of jejunum and ileum and degenerative changes in Auerbach's plexus, and physiologically by inability of the intramural apparatus of the intestine to produce acetylcholine.

With all available clinical and laboratory evidence to hand we can re-emphasize what Thaysen stated [this *Bulletin*, 1933, v. 30, 57], namely that "pernicious anemia, sprue (tropical and non-tropical), coeliac disease, nutritional macrocytic anemia and pellagra are closely related and allied diseases, probably having a common denominator, yet differing significantly in the body systems affected". This comprehension is of great contemporary interest in relation to the rôle of adrenocorticotrophic hormones in the study of gastro-intestinal absorption in sprue occurring in the tropics. [As has been frequently stated, this conception appears to render confusion more confounded.] *Philip Manson-Bahr*

HAEMATOLOGY

MONTESTRUC, E. Quelques particularités hématologiques intéressant la transfusion sanguine aux Antilles. [**Some Haematological Factors Relevant to Blood Transfusion in the Antilles**] *Arch. Inst. Pasteur de la Martinique.* 1953, July–Oct., v. 6, Nos. 3/4, 40–42.

With the opening of a blood transfusion centre in Fort de France, Martinique, the author surveys a number of points relating to transfusion among the local population. The main features are as follows:

(1) Anaemia is widespread. In 200 examinations of blood donors, the average number of red cells was about 4 million per cmm. and the haemoglobin 80 per cent. *Necator* infection accounts for much of this anaemia: in some areas all the people are infected and the incidence is rarely less than 50 per cent. in any region.

(2) Malaria endemicity is regressing in Martinique and parasites are now rarely found, but blood donors are examined regularly.

(3) The last survey for filariasis was in 1949 and it showed, among 105 recruits in Martinique, that 12 were infected, 10 with *W. bancrofti* and 2 with *F. ozzardi.*

(4) Leprosy may be so difficult to detect in its early stages that all potential donors suspected of having the disease are excluded. It is claimed that the haemagglutination and conditioned haemolysis tests may be of value in this respect.

(5) In 143 recruits, Kahn, Kline and Kolmer tests resulted in 78 (54·5 per cent.) positive results, though there was no evidence or history of syphilis: two months later, 62 per cent. of specimens were positive. The author attributes these results largely to the presence of yaws. Serological tests tend to persist after clinical cure and intensive treatment of yaws, but it is stated that the Vernes and VDRL tests tend to become negative slowly after treatment. Nevertheless, caution is exercised in choosing blood donors in such cases.

(6) The blood groups of 1,785 persons examined in 1952 were: group O, 49·5 per cent.; A, 29·6 per cent.; B, 17 per cent.; and AB, 3·8 per cent. The author considers that group O decreases and group A increases in incidence, as cross-breeding of the population becomes more pronounced. Thus, in 10 years, group O has fallen from 52·1 per cent. to 49·5 per cent. and group A has increased from 27·1 per cent. to 29·6 per cent.

(7) In 1951 and 1952, examination of 1,000 people showed that 94 per cent. carried the Rh factor: maternal and foetal accidents related to this are apparently less than in metropolitan France.

(8) In 1,000 persons of all ages and of each sex examined, the sickle-cell trait was found in 5·5 per cent. *H. J. O'D. Burke-Gaffney*

MACKEY, J. P. & VIVARELLI, F. **Sickle-Cell Anaemia.** [Correspondence.] *Brit. Med. J.* 1954, Jan. 30, 276.

These correspondents, writing from the Medical Laboratory, Dar es Salaam, refer to a previous letter in the *Brit. Med. J.*, 1953, v. 2, 1217, from LEHMANN: Dr. Lehmann had discussed the survival of the sickle-cell trait and referred to the suggestion of BRAIN [this *Bulletin*, 1953, v. 50, 241] that sickle-cell haemoglobin might give relative protection against malaria parasites.

The present correspondents quote from the Annual Report of their Laboratory for 1952 in support of this hypothesis. They sought and found

a heavy *P. falciparum* infection in a person with the sickle-cell trait. Many of the red cells were parasitized, but none of these were sickled: on the other hand, although sickled cells predominated, few of them were parasitized.

The need for careful investigation of this phenomenon is stressed: the possibility is suggested that sickle-cell haemoglobin may be an unsuitable environment for the development of the parasite or that, alternatively, parasitization of cells having some sickle-cell haemoglobin may result in sickling *in vivo* and phagocytosis, with resultant termination of the reproduction cycle in those cells.

It is noted that although the incidence of the sickle-cell trait in Dar es Salaam is 20 per cent. the trait was present in only one of 16 persons with heavy malaria infections. Furthermore, it was previously shown by the senior author that 16 per cent. of 330 infants, but 23 per cent. of 283 adults in Dar es Salaam showed the sickle-cell trait. Dar es Salaam is a hyper-endemic malarious area, so that it would appear that sicklers in this area are more likely to survive to adult life than non-sicklers.

H. J. O'D. Burke-Gaffney

Cooley, J. C., Peterson, W. L., Engel, C. E. & Jernigan, J. P. **Clinical Triad of Massive Splenic Infarction, Sicklemia Trait, and High Altitude Flying.** *J. Amer. Med. Ass.* 1954, Jan. 9, v. 154, No. 2, 111–13.

"Six cases of massive splenic infarction in Negro males following high altitude flying are described. In five cases sickling was demonstrated on laboratory preparation. Splenectomy is the treatment of choice and was carried out in all six cases. The triad of sicklemia trait, high altitude flying, and splenic infarction is discussed. Possible military implications are mentioned."

TOXOPLASMOSIS

Becker, B. J. P. **Toxoplasmic Encephalitis in South Africa. Report of Two Cases.** *South African Med. J.* 1954, Jan. 9, v. 28, No. 2, 21–4, 4 figs. [10 refs.]

"1. Two fatal cases of toxoplasmic encephalitis are described. The first —a classical example of the congenital type—occurred in a European infant from Northern Rhodesia; the second—an example of the fulminating encephalomalacic type—occurred in a European child living on the Witwatersrand.

"2. Attention is drawn briefly to the varied clinical forms which have been recorded in adults, especially the types which simulate tick typhus."

Skipper, E., Beverley, J. K. A. & Beattie, C. P. **Acquired Toxoplasmosis with a Report of Two Cases simulating Glandular Fever and One Possible Case resembling Typhus.** *Lancet.* 1954, Feb. 6, 287–90. [31 refs.]

This paper describes the main features of toxoplasmosis, both congenital and acquired, and refers to the relevant literature of the disease. The

features of the congenital variety are now well known and some 50 cases have been reported in Britain. Acquired toxoplasmosis occurs in both latent and active forms. The latent form is by far the most common for surveys by means of the cytoplasm modifying (dye) test and the complement-fixation test suggest that between a quarter and a half of our entire adult population have become infected although actual disease is not manifest. Hitherto no case of acquired toxoplasmosis has been recorded in Britain and here described are 3 cases, 2 of which are of the glandular type and the third a case of illness resembling typhus fever with a macular rash which may also have been toxoplasmosis. The diagnosis was made on serological and skin tests but attempts to isolate the organism by animal inoculation were unsuccessful. All 3 patients recovered. No really satisfactory treatment of toxoplasmosis has as yet been found. Since this paper was written a worker in the author's laboratory became ill after a finger prick and antibodies to a significant level have appeared in his serum.

The diagnosis of toxoplasmosis is discussed and it is considered that the possibility of this infection should be borne in mind in cases of adenopathy of doubtful aetiology. *M. E. Delafield*

Roth, W. Zur Serologie der Toxoplasmose. [**The Serology of Toxoplasmosis**] *Schweiz. med. Woch.* 1953, Aug. 8, v. 83, No. 32, 731–4, 1 graph. [26 refs.]

This is a critical evaluation of the current serological methods of diagnosis of toxoplasmosis, based on personal observations and intended for the guidance of less experienced clinicians. The rabbit skin neutralization test is considered to be too sensitive, for positive reactions are frequently obtained with the sera of normal persons. Other disadvantages of this method are its purely qualitative character, the costliness of the procedure, and the length of time (5–8 days) before the results are known. On the other hand, both the dye and complement-fixation tests provide a quantitative picture of the toxoplasmic antibodies present in the serum, and are of especial diagnostic value if the tests are repeated after an interval of 2–4 weeks. However, in the case of either test, the reaction to one may be positive when it is negative to the other. Therefore, the most reliable results are obtained by testing each sample of serum by both methods. As an extra precaution, the results of the serological tests should be assessed in conjunction with the clinical picture. *C. A. Hoare*

Sanger, V. L., Chamberlain, D. M., Chamberlain, K. W., Cole, C. R. & Farrell, R. L. **Toxoplasmosis. V. Isolation of Toxoplasma from Cattle.** *J. Amer. Vet. Med. Ass.* 1953, Aug., v. 123, No. 917, 87–91.

The authors record for the first time the occurrence in the United States of spontaneous cases of toxoplasmosis in cattle. The presence of the parasites was detected in the tissues of the uterus, spleen and lungs of 6 animals from a total of over 300 cattle belonging to 4 widely separated herds in Ohio. In 3 of the above cases the infection was also transmitted to mice by intraperitoneal inoculation of tissues, while one cow reacted positively to the toxoplasmin skin test and, at the time of parturition, showed parasites in the colostrum. In a calf examined at birth toxoplasms were found in organ emulsions, indicating that the infection was acquired *in utero*. Severe clinical symptoms and pathological changes of toxoplasmosis were observed both in spontaneously and experimentally infected

adult animals and calves. The disease was fatal in some cases, while in others the animals recovered. Since the parasites were found in the milk and muscles of infected animals, it is suggested that bovine toxoplasmosis might be of public health importance. *C. A. Hoare*

Summers, W. A. **The Chemotherapeutic Efficacy of 2,4-Diamino-5-P-Chlorophenyl-6-Ethylpyrimidine (Daraprim) in Experimental Toxoplasmosis.** *Amer. J. Trop. Med. & Hyg.* 1953, Nov., v. 2, No. 6, 1037–44.

It has already been shown by Eyles and Coleman [this *Bulletin*, 1953, v. 50, 158; 980] that Daraprim [Pyrimethamine] prevented death of white mice infected with *Toxoplasma gondii*, and that its activity was increased by concurrent administration of sulphadiazine. Nevertheless treated animals may still harbour infection which may prove fatal long after therapy has been discontinued, and for that reason difficulty is experienced in evaluating drugs unless the experimental hosts are observed over extended periods, which ranged here from 29 to 198 days. The same parasite was used as noted above and is virulent for mice, rabbits, and young rats. For purposes of infection peritoneal exudate diluted tenfold with saline from infected mice was used and generally caused death in 5 days when 0·1 ml. of this material was injected. Further dilutions of 10^2, 10^3 and 10^4 were also used. Drugs used were incorporated in the diet for a week or less before infection and were administered over a maximum period of 14 days. The survival time of the host during therapy was noted and the eradication of parasites was determined by examination of peritoneal washings for *Toxoplasma* or by inoculation of saline suspensions of brain, spleen, liver, or lung or experimental animals into healthy mice.

Daraprim, at a level of 0·01 per cent. in diet, did not prevent death of the host, and whereas 10 times this dose of drug preserved the life of many animals it proved toxic and eradication of *Toxoplasma* did not always occur. Evidence was obtained that pteroyl-glutamic acid reduced the toxicity of Daraprim, but did not affect antitoxoplasmal activity. The parasites were consistently eradicated from brain, spleen, liver, and lungs of mice by this drug when the inocula were not too heavy. *J. D. Fulton*

DERMATOLOGY AND FUNGUS DISEASES

Negroni, P. Estudios sobre el *Coccidioides immitis* Rixford et Gilchrist. XIII. Consideraciones sobre la endemia americana a propósito de una nueva observación. [**Studies on** *Coccidioides immitis*. **XIII. New Observations on Endemicity in America**] *Rev. Argentina Dermatosifilologia.* 1953, Apr.–Sept., v. 37, Nos. 2/3, 107–13, 2 figs. [30 refs.]

The English summary appended to the paper is as follows:—

" Posadas disease (coccidioidomycosis) is only endemic in arid zones of America, from 40° latitude N to 40° latitude S. These endemic areas have the same geographic and climatic characteristics: they are desertic, far from the humid winds of the Oceans from which they are sometimes separated by natural barriers, the climate is tropical or subtropical and of continental type, the soil is sandy and clayish and the vegetation is xerophilic.

" *Coccidioides immitis*. Half of the evolutive forms reported in Argentina come from this region and the neighbouring zone of Tucuman where we have obtained 20% of positive reactors among schoolboys."

Lacaz, C. S. **South-American Blastomycosis.** A Review. *Mycopathologia*. The Hague. 1953, Oct. 31, v. 6, No. 4, 241–59, 2 charts. [132 refs.]

MISCELLANEOUS DISEASES

Deschiens, R., Poirier, M. & Lamy, L. Diversité des réponses des éosinophilies aux hormones cortico-surrénale et corticotrope en fonction de leur étiologie. [**Different Responses of Eosinophiles to ACTH and Cortisone According to their Aetiology**] *Bull. Soc. Path. Exot.* 1953, v. 46, No. 5, 716–20.

To differentiate an eosinophilia due to helminthic parasitization from one not due to parasites, such as a tropical eosinophilia, the authors have used the cortisone, or ACTH injection test devised by Thorn and studied by Galliard, Lapierre, Larivière and Berdonneau [*Presse Méd.*, 1953, v. 61, 1205]. They gave 50 to 100 mgm. of the selected drug on alternate days for each 60 kgm. of body weight, over a period of 7 to 15 days, to a total of 350 to 700 mgm. They consider that divided doses over a period yield much more consistent results than does the single dose method advocated by the other workers.

In 9 cases of human tropical eosinophilia the eosinophile counts initially were from 30 to 64 per cent. (2,684 to 9,120 eosinophiles per c.mm. of blood) of the total white cell count. After a 15-day period of test along the lines mentioned these figures had fallen by 35 to 90 per cent. of the initial figure.

In 11 persons with parasitic eosinophilia (ascribed to *Strongyloides*, *Loa loa*, *Dipetalonema perstans*, ankylostome, *Ascaris* and whipworm infestations, either single or multiple) the eosinophile counts which ranged initially from 23 to 61 per cent. (1,426 to 7,189 eosinophiles per c.mm. of blood) of the total white cell count had fallen by only about 20 per cent. of the initial figures in all but one case of whipworm infestation, where the fall was 50 per cent.

In 3 guineapigs with eosinophilia of 10, 8 and 12 per cent., respectively, produced by the intramuscular injections of an extract of *Fasciola hepatica* [see this *Bulletin*, 1954, v. 51, 415], the initial figures were not significantly reduced at the end of the test.

In 3 cats with eosinophilia of 6, 13 and 14 per cent. respectively, ascribed to infestations with *Toxocara mystax* [" *cati* " or " *felis* "] the figures were not materially altered at the end of the test, and 24 hours after the first injection had indeed risen somewhat. And in 2 cats with eosinophilia of 6 and 12 per cent. respectively, ascribed to infestations with *Dipylidium caninum*, the figures at the end of the test were 5 per cent. and 7 per cent., indicating a fall of 40 per cent. of the original in the latter case of the two, but no change in the former.

In 3 guineapigs with eosinophilia of 19, 10 and 13 per cent. respectively, produced by intramuscular injection of an extract of red pigment, *Capsicum annuum*, the test with cortisone over 15 days caused a fall in the figures to 11, 6 and 5 per cent. respectively. In 3 other guineapigs with eosinophilia of 6, 7 and 10 per cent. respectively, a test with ACTH for 3 days brought the figures down to 0, 1 and 1 per cent.

A histological study of the suprarenal glands of the guineapigs given an extract of *Fasciola hepatica*, in which the eosinophilia was not reduced by the test, and of the suprarenals from those injected with pigment, in which the eosinophilia was reduced by the test, showed congestive and degenerative lesions in the glandular cells in the former, but only juxta-medullary congestion and a hyperplasia of the reticular zone in the latter.

The authors conclude that it is possible to distinguish between a parasitic and a non-parasitic eosinophilia by giving cortisone or ACTH in divided doses over an adequate period (1–2 weeks). It is suggested that there are changes in the histopathology and function of the suprarenal glands in the case of eosinophilia of parasitic causation. A number of factors which may affect the result of the test are suggested. [See also this *Bulletin*, 1954, v. 51, 299, 433.] *A. R. D. Adams*

Deschiens, R., Poirier, M. & Lamy, L. Présentation de préparations relatives aux altérations anatomopathologiques de la surrénale dans les éosinophilies expérimentales réductibles et irréductibles du cobaye. [**Demonstration of Preparations Showing Histological Changes in the Suprarenal in Experimental Eosinophilia in Guineapigs**] *Bull. Soc. Path. Exot.* 1953, v. 46, No. 5, 720.

A repetition of the observations contained in the penultimate paragraph of the abstract of the preceding paper.

[The reasoning in these papers is not easy to follow and the results and conclusions do not emerge clearly.] *A. R. D. Adams*

PARASITOLOGY: GENERAL

Chieffi, G. & Digilio, V. Osservazioni sulla sopravvivenza dei protozoi nelle feci: azione della temperatura. [**Observations on the Survival of Protozoa in Faeces: Effect of Temperature**] *Acta Med. Italica.* 1953, Apr., v. 8, No. 4, 92–6. [10 refs.] English summary.

The authors record the results of experiments on the effect of different temperatures on the survival of human intestinal protozoa in faeces. Stools obtained with a saline purgative from patients at the Clinic for Tropical Diseases of Naples, were placed in 3 series of covered Petri dishes, which were kept at 37°, 18°–25° (room) and 4°–6°C. (refrigerator) respectively. Samples of the faeces were examined microscopically in fresh, iodine-treated, and stained preparations. In all cases the trophozoites and cysts of the intestinal protozoa, among which *Entamoeba histolytica*, *E. coli*, *Trichomonas hominis*, *Chilomastix mesnili* and *Giardia intestinalis* were present, survived much longer in the refrigerator and at room temperature than in the incubator. The authors suggest that this difference is due to less putrefaction and fermentation at the lower temperatures.

C. A. Hoare

Gilles, H. M., Maegraith, B. G. & Andrews, W. H. H. **The Liver in** *Babesia canis* **Infection.** *Ann. Trop. Med. & Parasit.* 1953, Dec., v. 47, No. 4, 426–30, 1 fig. on pl.

ENTOMOLOGY AND INSECTICIDES: GENERAL

[Papers on the toxic effects of insecticides in man are abstracted in the *Bulletin of Hygiene* under the general heading of Occupational Hygiene and Toxicology.]

Burton, G. J. **Photomicrography of Mosquitoes with the Single-Lens Reflex Camera.** *Mosquito News.* 1953, Dec., v. 13, No. 4, 248–52, 3 figs.

Martínez Palacios, A. & Vargas, L. Confirmacion de la presencia de *Anopheles* (*Kerteszia*) *neivai* H.D. & K. 1917, en México. [**Confirmation of the Presence of** *Anopheles* (*Kerteszia*) *neivai* **in Mexico**] Reprinted from *Rev. Soc. Mexicana de Hist. Nat.* 1952, Dec., v. 13, Nos. 1/4, 45–6.

Kitzmiller, J. B. Etude de souches de laboratoire de *Culex pipiens* et *Culex fatigans*. [**A study of Laboratory Cultures of** *Culex pipiens* **and** *Culex fatigans*] *Ann. Parasit. Humaine et Comparée.* 1953, v. 28, No. 4, 321–5.

A culture of *Culex pipiens* and 3 cultures of *Culex fatigans*, each of different origin, have been maintained in the laboratory over a period of several years. Both mosquitoes have been found to be stenogamous, mating in cages 30 × 30 × 30 cm., and both require a blood meal, preferably from a bird, before egg production can take place. It has been found that *C. pipiens* females produce eggs until December, after which they normally cease feeding; however, if the lights are kept burning day and night, biting and egg production continue but with an increased time interval between. The *C. fatigans* females have produced eggs continuously over a period of 2 years.

Brother-sister matings have been carried out in one culture of *C. fatigans* for 14 generations and in the *C. pipiens* culture for 8 generations. Genetical experiments are being done on these mosquitoes. *Anne Hudson*

Martínez Palacios, A. Nota sobre la distribucion de los mosquitos *Culex* en México (Diptera: Culicidae). [**Notes on Distribution of** *Culex* **Mosquitoes in Mexico**] Reprinted from *Rev. Soc. Mexicana de Hist. Nat.* 1952, Dec., v. 13, Nos. 1/4, 75–87.

Geigy, R. & Utzinger, G. E. Konstitution und insektenabhaltende Wirkung neuer Amide und die verwendeten Testmethoden. [Miscellanea] [**Constitution and Insect Repellent Effect of Newer Amides and Methods of Testing Them**] *Acta Tropica.* Basle. 1953, v. 10, No. 4, 349–60, 1 fig. [12 refs.]

Two methods of testing repellents are described; one employing a blood-sucking insect (*Aëdes aegypti*) and one using the wood ant (*Formica rufa*). It is pointed out that, when repellents are tested for blood-sucking insects, variations in the attractiveness of the host and the hunger of the insect constitute disturbing factors. Hence the non-blood-sucking ant was considered likely to give more consistent results, though its activity and responses might also fluctuate with climatic conditions.

The mosquitoes used in the tests were reared at 26°C. and in 85 per cent. R.H. They were fed once or twice on a guineapig and allowed to digest the last meal completely before the experiments. The person who

conducted these tests [apparently a woman] applied the repellent to her left forearm a few hours before exposure. It was then thrust into a cage (34 × 35 × 41 cm.) containing 100 female mosquitoes. Only part of the forearm was exposed; the hand was protected by a thick woollen glove. The mosquitoes readily settled on the glove when hungry, especially when repelled from the arm. Hence a count of the total settling on both areas gave an indication of their activity and hunger. The numbers of mosquitoes settling and actually feeding were recorded over a 20-minute exposure. The repellence was indicated by numbers probing or numbers feeding as a ratio of the total number of visits to arm and glove.

In the tests with the red wood ants, batches of 10–15 ants were enclosed in a cylindrical wire cage 20 m. long and 5 cm. in diameter. At one end a circle of filter paper impregnated with 10 mgm. of a sample was enclosed, with an untreated paper at the opposite end. Ants walking over either paper for 3 seconds were recorded until a total of 100 visits had been noted. The proportions on the treated paper indicated the degree of repellence.

The authors give comparative results of a dozen or so compounds or mixtures. The data have some fundamental interest on the effects of certain atomic groups on repellence, *e.g.* diethylamide, adjacent dimethyl combined with a C : C double-bond and diethylamide plus adjacent dimethyl groups: also certain chlorinated compounds. In some cases the samples were tested before and after washing with cold water. Though the compounds were insoluble in water the latter reduced their effect by mechanical leaching. *J. R. Busvine*

Busvine, J. R. & Harrison, C. Mary. **Tests for Insecticide-Resistance in Lice, Mosquitos and House-Flies.** *Bull. Entom. Res.* 1953, Dec., v. 44, Pt. 4, 729–38, 1 fig.

" Between December 1947 and May 1949, six colonies of body lice from various sources were cultured in the laboratory. Three of the strains originated from natural infestations in England and the others came from laboratory cultures in Hamburg, Basle and Tunis. After being bred for at least one generation in the laboratory, these lice were subjected to a standard test for resistance to DDT. Only one strain showed any evidence of abnormal resistance; this was the strain from Tunis where it had been laboratory-cultured for over 12 years.

" Colonies of *Aëdes aegypti* from Karachi, Poona and Delhi were being cultured at the Virus Research Institute, Lagos, together with a local Nigerian strain. Extensive tests showed no difference in average susceptibility of the four strains to DDT, though there was some evidence of differences in the spread of resistance through the various populations.

" A colony of *A. aegypti* was started with larvae taken from Ilaro, a Nigerian town which had been regularly sprayed with BHC for 2½ years. Comparative tests showed no difference in resistance to γ BHC between this colony and a laboratory culture at the Malaria Service Laboratory, Lagos.

" Colonies of house-flies were initiated and maintained at Lagos. Tests with insecticides gave the following results:

" (a) *M. d. vicina* from Ilaro were much more resistant to γ BHC than similar flies from Yaba, near Lagos, or *M. d. domestica* from England.

" (b) The *M. d. vicina* from both Lagos and Ilaro were considerably more resistant to DDT than *M. d. domestica* from England. This is surprising,

as no DDT-spraying has been done at Ilaro and, so far as can be ascertained, virtually none in Lagos.

"(c) The *M. d. vicina* flies from Lagos were considerably more susceptible to γ BHC and dieldrin than *M. d. domestica* from England. *M. sorbens* was much more susceptible to γ BHC and to DDT. These differences could be explained by the smaller average sizes of the two susceptible species."

Sullivan, W. N. & Hornstein, I. **Concentrations and Exposure Time of Lindane Vapor required to Kill Insects.** *J. Econom. Entom.* 1953, Oct., v. 46, No. 5, 898–9.

Most of the tests were done in a Peet-Grady chamber. The lindane (99 per cent. *gamma* BHC) was volatilized by an electric fan playing on impregnated glass-fibre fabric. Chemical estimations of the air inside, gave the following concentrations of *gamma* BHC per litre: 0·60 μgm. at 24°C. and 1·19 μgm. at 30°C. These correspond to 70 and 65 per cent. saturation, respectively.

Insects of 4 species were exposed for various periods and the mortalities noted [it is not stated when]. The following are typical results:—

Species	*Exposure* (mins.)	*Percentage kill* 24°C.	30°C.
Periplaneta americana ...	60	21	33
Tribolium confusum	,,	12	67
Acanthoscelides obtectus ...	15	80	95
Musca domestica	2	59	75
,, ,, ...	10	90	100
Aëdes aegypti	2	99	100

It will be seen that, although small, flying insects are easily killed by the concentrations attained, the 2 beetles and the cockroach require very much longer exposures which would probably be seldom practicable.

J. R. Busvine

Pratt, J. J., Jr. & Babers, F. H. **The Resistance of Insects to Insecticides. Some Differences between Strains of House Flies.** *J. Econom. Entom.* 1953, Oct., v. 46, No. 5, 864–9. [24 refs.]

Measurements of cholinesterase activity (of the head), oxygen consumption and resistance to topically applied DDT in acetone, were made on 6 susceptible and 3 resistant strains of house-fly. The mean cholinesterase activity was found to vary considerably in different strains and also in the same strain from one season to another. Usually, that of the resistant strains was lower than normal, but in view of the previous remarks, this is of doubtful significance.

The oxygen consumption of 3 susceptible and 3 resistant strains was measured and a significant difference was noted in only one strain (albeit, the most resistant) which was higher than the others. However, one of the resistant strains was lower than any others.

Measurements of the mortality caused by application of 0·3 μgm. DDT per fly was made in the 6 susceptible strains. Mortalities ranged from 7 to 83 per cent. Of 15 possible comparisons between strains, 11 were statistically significant. However, since the strains were reared in different ways, this is not very surprising.

J. R. Busvine

Pratt, J. J., Jr. & Babers, F. H. **Sensitivity to DDT of Nerve Ganglia of Susceptible and Resistant House Flies.** *J. Econom. Entom.* 1953, Aug., v. 46, No. 4, 700–702.

There is disagreement in the literature as to whether the greater ability of resistant flies to metabolize DDT is a cause or effect of resistance. Since DDT can be present in the tissues of resistant flies and yet not poison them, the authors felt it probable that some other mechanism inhibits the poisoning of resistant flies by DDT, and that difference in ability to metabolize may be associated with the degree to which the fly is poisoned.

The authors investigated the comparative susceptibility to DDT poisoning of nerve tissues of susceptible and resistant flies. The fused thoracic ganglion was exposed in 3-day-old flies sealed to a block of beeswax. Five legs were removed and when DDT emulsion was applied direct to the ganglion surface the tremor in an attached metathoracic leg was used as a criterion of poisoning. DDT was applied in 1 cmm. of an emulsion made from a stock solution, containing 10 per cent. each of DDT and Triton X-100 in Cellosolve and Hobson's saline.

From data presented it is seen that symptoms of poisoning appeared within 5 minutes after treatment in more susceptible than resistant flies, and fewer resistant than susceptible flies had poisoning symptoms when observed at a given time after treatment. These observations suggest that the dosage threshold for poisoning by DDT is higher in resistant than in susceptible flies, and that probably the more rapid recovery in resistant flies is due to detoxification of DDT. However, attention is drawn to the fact that this more rapid recovery does not necessarily indicate a faster rate of detoxification in resistant flies, for in poisoned flies detoxification would result in cessation of symptoms sooner in resistant than in susceptible individuals, owing to the difference in their dosage thresholds for poisoning.

Thomas E. Fletcher

Gaud, J. & Laurent, J. Observations sur les phlébotomes de la région de Rabat. [**Notes on** *Phlebotomus* **in Rabat, Morocco**] *Bull. Inst. Hyg. Maroc.* 1952, v. 12, Nos. 1/2, 73–6.

In and around Rabat on the coast of Morocco the authors have made discontinuous collections of *Phlebotomus* during the years 1947–1952. Their captures are listed by species, sex and month. The total comes to 1,844 specimens and shows 5 species, namely *P. minutus parroti*, 61 per cent.; *longicuspis*, 18 per cent.; *sergenti*, 13 per cent.; and 2 rarer species, *ariasi* and *perniciosus*.

The sandflies appear first in April, increase in numbers until July then become rarer to September and by November have apparently disappeared. They have been found in artificial and natural hollows and caves (grottoes) and (except *P. ariasi*) in houses (especially the toilets). *P. minutus parroti* has been taken in bathing huts on the beach.

As far as is known at present these species of *Phlebotomus* do not transmit any disease of man or animal at Rabat or its immediate vicinity.

H. S. Leeson

See also p. 477, Vargas & Díaz Nájera, Flebótomos comunes a México y a los Estados Unidos. [*Phlebotomus* **Species Common to Mexico and the United States.**]

Oldroyd, H. **The Diptera of the Territory of New Guinea. XIV. Family Tabanidae. Part III. Tabanidae.** Reprinted from *Proc. Linnean Soc. of New South Wales.* 1948, v. 73, Pts. 5/6, 304–61, 71 figs.

Hase, A. Über Menschenläuse (*Anoplura*). Bibliographien, Geschichte der Forschungen, Eier und Mikropylapparat. [**Bibliography Account of Researches and Observations on the Eggs and Micropyle Apparatus of Anoplura**] *Ztschr. f. Parasitenk.* 1954, v. 16, No. 2, 145–90, 18 figs. [Numerous refs.]

LABORATORY PROCEDURES

Cole, E. R. & Sewell, A. K. **The Preparation and Stability of Field's Stain.** *Med. J. Australia.* 1953, Sept. 12, v. 2, No. 11, 415–17.

Any stain containing azure I or azure II is liable to be unreliable because of the presence of undesirable lower azures. The authors therefore devised a method for preparing the methylene blue and azure I mixture, as used in Field's stain, which would give a standardized ratio, the latter being determined by spectral absorption. Field's solution A was prepared therefore as follows:—

Methylene blue (86 per cent.—or equivalent quantity for different products, such as the 80 per cent. of British manufacture) 5 gm. are dissolved in 300 cc. distilled water; 3·4 cc. sulphuric acid are added and the solution is boiled. Then 10 cc. of potassium dichromate (10 per cent.) are added and boiling is continued for 20 minutes, water being added throughout to keep the volume constant. When cool, 10 gm. of sodium bicarbonate are cautiously added, followed by 50 gm. of disodium hydrogen phosphate ($Na_2HPO_4.12H_2O$) and 25 gm. of potassium dihydrogen phosphate. Finally, the solution is diluted to 500 cc. Before staining, " one part was diluted to four parts with distilled water ". Storage in corked full bottles at room temperature caused no change in the *p*H (6·6) or in staining qualities for 5 years. *P. C. C. Garnham*

REPORTS AND SURVEYS

White, F. N. **Retrospect.** [Presidential Address.] *Trans. Roy. Soc. Trop. Med. & Hyg.* 1953, Nov., v. 47, No. 6, 441–50.

A presidential address to a medical society is usually an occasion for summing up some subject of limited scope, or for an essay on medicine, or for a record of personal experience. In his inaugural address Dr. Norman White turned the attention of his audience to his own recollections of events in tropical and international medicine which have occurred since the beginning of the century.

But the story he unfolded was not primarily one of the diseases conventionally regarded as tropical, though he saw his fill of those. The event which obviously most impressed him in his 17 years of service in India was the great epidemic wave of influenza which, within the space of two months in the autumn of 1918, produced a catastrophe almost without parallel in the history of epidemics, killing six million people in India alone. At that time Dr. White was acting as Sanitary Commissioner of the Government of India, and was therefore in a position of administrative authority; his experience in this epidemic led to his being appointed to an international conference convened in Europe to take stock of the influenza situation, and shortly afterwards to his being asked to assume medical charge of the international Epidemic Commission of the League of Nations, which was to take

action in the face of the devastating epidemic of typhus then ravaging eastern Europe. In his account of this work Dr. White paid high tribute to his colleagues, and to the Russian doctors and nurses who worked so devotedly in appalling conditions.

Dr. White remained with the League of Nations for 15 years, and undertook a journey to the Far East in 1922–23 for the League. One result of this was that the Epidemiological Intelligence Bureau was set up in Singapore in 1925; it continues its useful work to the present time.

Dr. White's address contains the names of many distinguished medical men whom he knew and loved. He worked at a time when facilities for treatment and control of disease were much poorer than they now are, and when the conception of international cooperation in the control of disease was in its infancy. He took a lead in the far-reaching decisions which did so much to establish the Health Organizations of the League, universally recognized as one of its outstanding features, the predecessor of the World Health Organization. The address is in the main a recollection of those heroic times and the men who faced catastrophe with resolution, and in a way it is a warning that we may not have seen the end of such devastating epidemics. The author is a great man, and the mark he has made on international public health is permanent. He is remembered with affection at the present time in the School of Hygiene at Athens, of which he was head in its formative years. *Charles Wilcocks*

Montalván C., J. A. Aporte cientifico del Instituto Nacional de Higiene a la salud pública ecuatoriana. [**Scientific Contribution of the National Institute of Hygiene to the Public Health of Ecuador**] *Rev. Ecuatoriana de Hig. y Med. Trop.* Guayaquil. 1952, Jan.–Dec., v. 8/9, Nos. 1/4, 1–14. [55 refs.]

This is an account by its Director of the scientific accomplishments of the National Institute of Hygiene of Ecuador during its 10 years of existence. Reports of researches and investigations that have been carried out by members of its staff have been published in the pages of the *Revista Ecuatoriana de Higiene y Medicina Tropical*: these are listed, 55 references, at the end of the paper. The scope and significance of all these investigations are indicated; in some cases they are described at some length. They cover a wide field: typhus fever (murine typhus was found among the rats of Guayaquil); tuberculosis and BCG vaccination; plague; Chagas's disease; enteric fevers; trachoma; helminth infections; cutaneous leishmaniasis; alastrim; syphilis; malariology; food and drug control; control of biological products. The paper opens and closes with tributes to the memory of the founder of the Institute, Leopoldo Izquieta Pérez.

Norman White

Bolivia: Ministerio de Higiene y Salubridad. División de Endemias Rurales. Organismo mantenido por cooperación entre el Gobierno de Bolivia y la División Sanitaria Internacional de la Fundación Rockefeller. Informe Anual 1952. [**Annual Report for 1952 of the Organization for Co-operation between the Bolivian Government and the International Sanitary Division of the Rockefeller Foundation**] 31 pp., 5 maps. 1953, La Paz-Bolivia.

This is an account of the activities of the Division of Rural Endemic Diseases of the Bolivian Ministry of Health during 1952. The Division is composed of 6 Services: yellow fever; malaria; plague; typhus fever and disinfestation; ankylostomiasis; and central administration. The Division, which is staffed by whole-time personnel trained in

public health and tropical medicine, with security of tenure, adequately remunerated and free from political interference, owes its origin to the cooperation given by the International Health Division of the Rockefeller Foundation to the Government of Bolivia in the solution of pressing public health problems. This collaboration began in 1932 when yellow fever was epidemic in Santa Cruz: the yellow fever service was set up and has to its credit the elimination of *Aëdes aegypti* from the towns of Bolivia. In 1942 the Government invited the Foundation to extend its activities to malaria control: malaria in epidemic form was then afflicting the city of Cochabamba. In 1948 the campaign against typhus fever was commenced: in this work UNICEF and the Panamerican Health Administration subsequently rendered assistance. Thus 20 years' fruitful collaboration with the Rockefeller Foundation has led to the establishment of the Rural Endemic Diseases Division directed and staffed by qualified Bolivian personnel.

During 1952 only one case of rural yellow fever was reported, in the La Paz region. There were 69 viscerotomy posts functioning throughout the year. There were originally 65 localities in which *Aëdes aegypti* had been found: 62 of these were inspected in 1952 and the continued absence of the species was confirmed in all. The number of yellow fever vaccinations performed was 10,708.

Malaria incidence appears to be decreasing: 57,000 houses were sprayed with DDT in 1952. There were 55 cases of plague with 28 deaths. Typhus fever is endemic in certain areas of high altitude and is rare below 2,800 metres: 71 cases with 6 deaths were confirmed during the year.

Norman White

BOOK REVIEW

Mackinnon, Juan Enrique, in collaboration with Samuel Barnsley Pessôa, Félix Pifano & Alfonso Trejos. **Parasitology (1949–1950).** 287 pp. 1953. Montevideo: Unesco Science Cooperation Office for Latin America, Bulevar Artigas 1320.

This volume has been issued by the Unesco Science Cooperation Office for Latin America; it contains connected accounts of work in various subjects drawn from papers published in the years 1949 and 1950. Two other volumes have been issued, on Chemistry and Mathematics respectively, and the present volume includes work on the Protozoa, Helminths, Arthropods and Fungi. The papers referred to are by Latin American authors and by others who have lived in Latin America or have worked in Latin American institutions.

The result is a publication of considerable interest but of limited value. The interest is in the range of subjects and the amount of significant work; the value is limited because, although many of the subjects are particularly important to Latin America, they are nevertheless much more universal than local, and the stream of Latin American work is therefore separated from that of other countries. There seems to be no good reason why an ambitious attempt like this to summarize scientific work should be restricted for geographical reasons, except, perhaps, that much of the work has been reported in Spanish, and the present account makes it available to readers of English.

As would be expected, Chagas's disease, malaria and schistosomiasis are given prominence.

Charles Wilcocks

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